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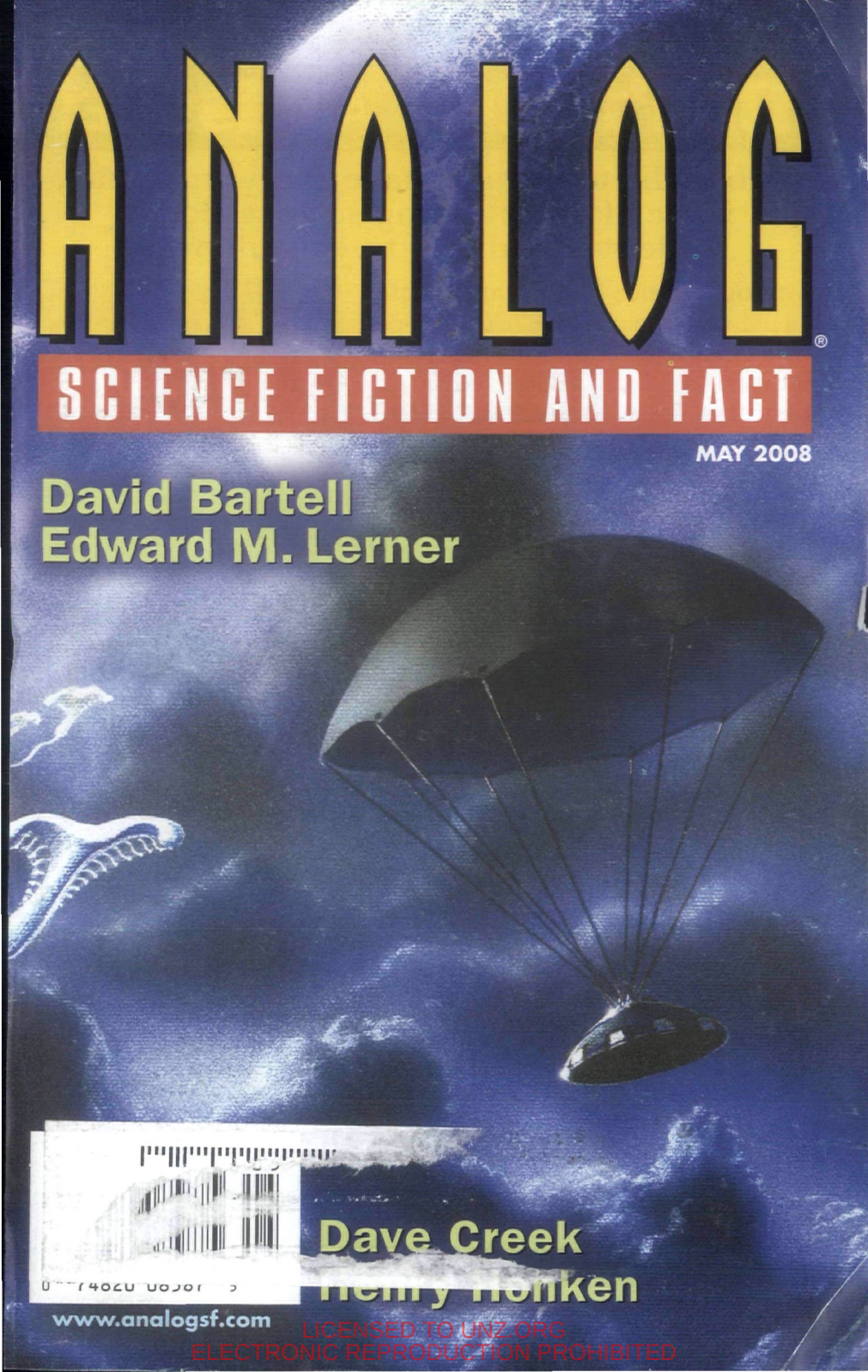

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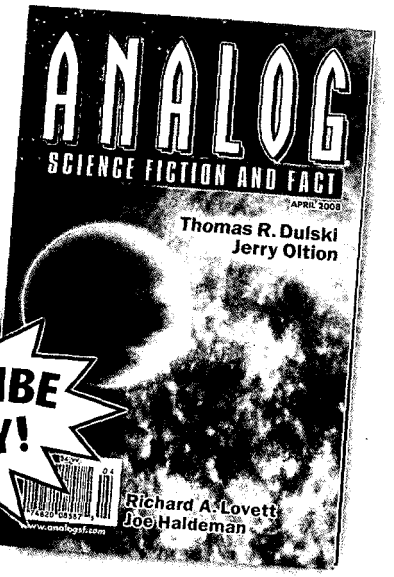

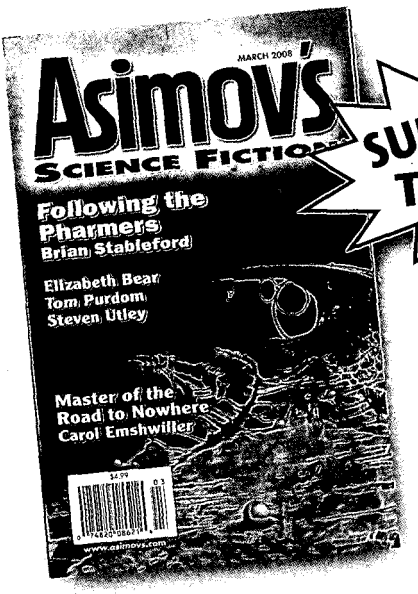

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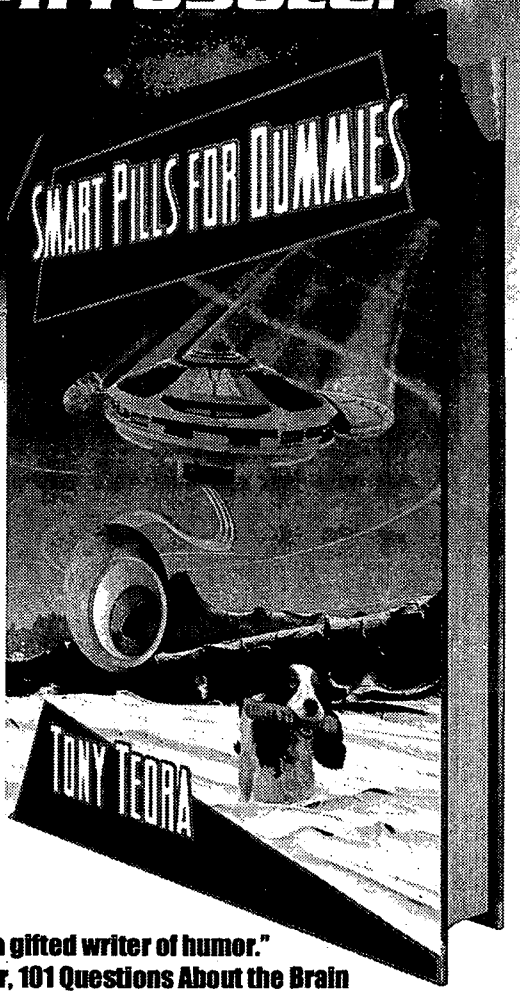

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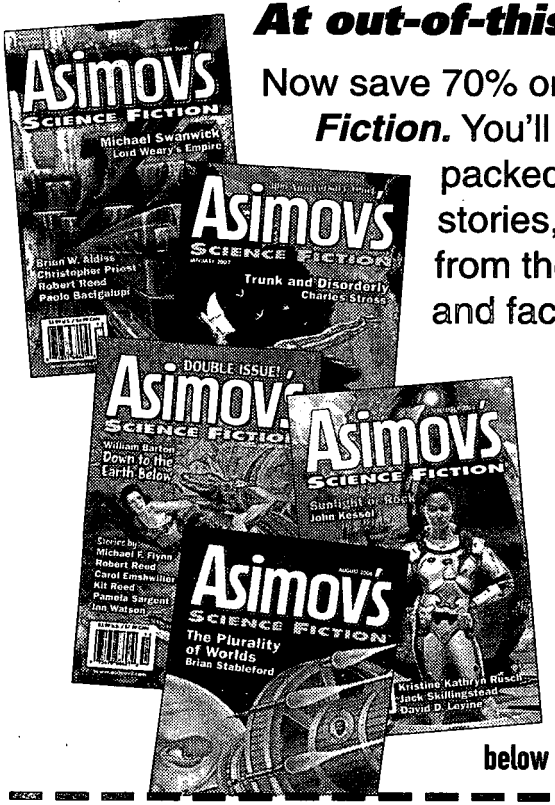

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EDITORIAL Stanley Schmidt

UPS AND DOWNS

A while back ("Double Standard Required," December 2007) I wrote here that global overpopulation is the central problem we must deal with if we are to find long-term solutions to subsidiary problems like global warming and resource depletion. A few readers, including some who on the whole agreed with me, pointed out that some countries are facing the opposite problem: rapidly and "dangerously" *declining* populations.

Are such declines really dangerous? Or are they another example of an opportunity being mistaken for a problem?

Before we do anything else, let's stipulate that the alleged declines are real and significant, and emphasize that that fact does not contradict the reality that *global* population is growing dangerously. I was reminded of this during my recent trip to Japan, during which I read a small article in Japan Air Lines' in-flight magazine asserting that the birth rate in Japan is down to 1.26 per woman, which is well below the "replacement rate" of about 2[1]. The article attributed the low birth rate in Japan to sociological factors such as more women refusing traditional roles, e.g., they're working longer, marrying later, and having fewer children. Other highly developed countries also have lower-than-replacement birth rates, though not always for the same reasons. In Russia, it's due to deteriorating health care and consequently deteriorating overall health. The U.S. demonstrates that the trends can be more complicated than they sound: our population is still growing, but that's mainly because of immigration, not births. The *birth* rate here is slightly below the replacement level.

From a purely local point of view, considering only short-term effects within a single country and assuming that the inhabitants go on doing everything else in the same ways they're used to, a low birth rate and declining population can indeed look alarming. Japan, for example, is concerned about labor shortages, and therefore is looking for ways to reverse the trend by encouraging big families. In at least one prefecture (an approximate Japanese counterpart of a state in the U.S.), companies are giving employees hefty bonuses for each additional child they have—and the more children (up to five), the bigger the bonus.

[1]We're commonly told that the "replacement fertility rate" is 2.1: that is, on average, women must have that many children to maintain a steady population. The actual figure to give that effect depends on a complex interaction of such variables as infant mortality, whether the sex ratio is being tinkered with by such means as selective abortion, and the extent to which life expectancies are rising or falling because of advances or declines in medicine. 2.1 is currently pretty close to a worldwide average, but it has been much higher through most of history, and still varies widely among countries. In both Japan and the U.S., it's currently quite close to 2.1.

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Understandable, up to a point, yet disturbingly at odds with two larger facts: (1) Worldwide population growth is still the biggest threat we all face (most of the others are just side effects), and (2) Japan itself is already so crowded that its culture is full of adaptations to enable large numbers of people to coexist in a small area. So, in the long run, is encouraging increased birth rates, even locally, really a good idea, either globally or locally?

Probably not. But what are the alternatives?

What's happening in the U.S. demonstrates one possibility, at least as a stopgap: many labor niches are currently being filled (as has often been true in our relatively short history) by immigrants from other countries. Americans have often proudly thought of their country as a "melting pot" in which people of many backgrounds are welcomed and merge into a new culture called "American." That attitude has, of course, undergone some evolution. Not everyone is quite so welcoming these days (though the issue has been muddied by fuzzy thinking about "immigration" and "legality"); and not all immigrants are so willing to be "melted," preferring to maintain their old cultural identities even in their new homes. Neither the "melting pot" nor the "mosaic" version of assimilation sits well with the Japanese culture. Whereas American culture was forged from the beginning by a melding of elements from many sources, Japan was essentially isolated for many centuries and evolved a finely honed culture of its own. It now places a high value on preserving the essence of that culture even as it adopts modern technologies, and makes little provision for trying to assimilate immigrants from elsewhere. So most Japanese do not see large-scale importation of foreign workers as a viable solution to their perceived problems.

It doesn't address the larger problem in America, either. A wave of immigration may provide an immediate solution to labor shortages here, but it takes those people away from their home countries, where they may be needed even more. They come here only because of the possibility of making more money here than they could at home, and sending it back to their families. This suggests larger social problems back home. Many immigrants are skilled professionals in their own countries, but here must accept relatively menial employment because of the language barrier, licensing requirements, etc. They wouldn't need to do that if their homelands could provide them with pay commensurate with their skills.

And, of course, importing workers to countries that aren't producing enough of their own does nothing for the worldwide population problem; it just redistributes it. Discouraging immigration and encouraging a greatly increased do-

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mestic birth rate—anywhere—goes even further. Not only does it not help head off worldwide overpopulation, it actively exacerbates the problem.

So the fact that some countries—usually highly developed ones—are experiencing local population declines in no way negates the dangers of global overpopulation. That remains an overarching problem to which we all need a solution. Local declines simply create a different set of local problems that need to be dealt with at the same time as the larger one.

But the "big" and "little" problems seem to make opposite demands. How can we meet both of them at once?

It seems pretty clear that any real solution will have to involve changing attitudes toward at least one of them, and the ways cultures deal with them. Such changes are seldom made lightly or easily; cultures are massive objects, not easily deflected from their present courses. So when they grudgingly recognize that some change is necessary, they try relatively easy ones first—but those are seldom enough. Urging the birthrate upward in an already crowded country exacerbates the existing crowding as well as the global problem. Inviting large-scale immigration merely redistributes the problem, at best; and that's if a country is already used to assimilating immigrants. In one that isn't, and that places a high priority on maintaining an established and relatively monolithic culture, such a course requires a major and difficult shift in mindset.

Such a major shift may well be needed, but that may not be the most productive one. In the U.S., at least, most of us have been bombarded since birth with the dogmas that "Bigger is better" and "If you don't grow, you die." It may well be time to revise those assumptions, because we seem at least close to a point at which too much growth may *cause* us to die. We may need to shift our thinking to recognize that everything *doesn't* always have to get bigger to get better—and getting *smaller* may sometimes be the better way to go.

Even if the world's population could be stabilized immediately, resource use, global warming, and related variables would continue to climb. Many of the world's people have a much lower material standard of living than places like the U.S., western Europe, Australia, and Japan—not because they prefer to, but because they haven't yet managed to get

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it that high. But most of them would like to, and as they approach that goal, their per capita resource consumption and generation of waste byproducts will rise, too. Ironically, history suggests that such a rise in standard of living is likely to be accompanied by a slowing of population growth—but for the reason just mentioned, even more will be needed.

Maybe, instead of reflexively regarding local drops in population as threats, we need to reorient our thinking to see how an actual decrease in population could lead to *better* lives—not just locally, but globally. Maybe we should aspire to not only slowing the growth of our planet's total population, but allowing and even encouraging it to shrink—and turning that to everybody's advantage.

I probably need to emphasize at this point that I'm *not* advocating any sort of *forcible* reduction in population—no "ethnic cleansing," intentional plagues, wars, or killing of any sort. I'm suggesting nothing more than attrition—that if we let birth rates drop below replacement levels *everywhere*, for a while[2], we might wind up with a world in which more people were healthier and happier than ever before.

But is that possible? Aren't the problems of countries now experiencing below-replacement birth rates proof by example that such a course would amount to cultural suicide?

No, they are not. Our long-term survival and prosperity may depend on our ridding ourselves of the deeply ingrained assumption that they are. Low birth rates now seem like a threat for the same reason that low employment is assumed to be automatically and intrinsically bad. Our society has evolved a system of operation based on jobs, and a system for evaluation of its success based in large part on "full employment." People who are unemployed don't have a way to support themselves, so if there are too many of them, we scramble to "create jobs": things for people to do and be paid for, whether or not there's any real need for those things to be done. It seldom occurs to us that we could instead decide that there's not enough necessary work to go around, so we should redistribute what there is so that everybody has a job but nobody has to work as much.

Similarly, if we've created a lot of make-work jobs to match their number to the available workers, and the number of available workers declines, we complain that there aren't enough workers to do them; so we either bring in more from outside, or encourage people to breed faster. Why not instead see if we can reduce the amount of work so the available workers can handle it?

There are at least two main ways we might do this. First, we could recognize that many of the jobs we "need" done aren't really needs at all. Browse any of those "in-flight mall" catalogs and see how many essentially useless gimmicks are being manufactured solely to help the rich flaunt their wealth and to provide employment for those who make them. How many people do we really need to hold doors or do nails for other people? Admittedly many of the things that make civilized life enjoyable are not necessities—a case could be made that the world doesn't really *need* expensive restaurants, baseball players, opera singers, or science fiction editors, for example—and most of us would rather not get rid of all of those. But surely there's some room for cutting back, and learning to be more self-reliant and less dependent on expensive services provided by other people.

Especially when you consider the other way we might reduce the need for workers: by the use of technology. In a culture geared to full employment as an end in itself, replacement of people by machines is a sore topic. But if we can learn to look beyond that mindset,

[2] Obviously a *permanent* drop to such levels would ultimately be self-destructive.

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maybe we can learn to see such replacement, handled thoughtfully and carefully, as a way of improving human life rather than just "throwing people out of work." There are plenty of tedious jobs that I would be glad to let a machine do for me, and I'll bet you have a comparable list of your own, which may or may not be the same as mine. A well-handled transition to turning over more such jobs to machines could enable us to maintain or even improve the standard of living for everybody, while allowing everybody more time to do things they *want* to do rather than things they *have* to do—even with substantially fewer people. Conceivably, particularly if nanotechnology research achieves as much as seems possible, this process could go very far indeed, with fewer total people on the planet, but more of them enjoying better lives than ever before.

Doing that will, undeniably, require a major shift in thinking at both individual and cultural levels. But it's time to start seriously considering how we might achieve that shift. Our past history has all been geared toward growing population, and we've been conditioned to take it for granted that population can and must go only *up*. It's time to recognize that it can have both ups and downs, and to learn how to make the best of both. ■

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Test Signals

David Bartell

New technologies create new moral dilemmas—but not simple ones.

I clicked the Promote Target icon on my desk and claimed another minor victory. "Just one more to go," I said out loud, "and it's vacation time!"

"What is it?" came the voice of Kaitlin from over the short cubical wall.

"Some kind of squirrel monkey," I said, noting the genetic ancestry.

"I thought that was already a real animal."

"This hybrid is different. Kinda cute. Wanna see?"

"Nah. Too busy."

Me too. My job was to discover something by accident, and I had a quota to meet.

A lot of scientific discoveries are made by accident, like say, penicillin, or matches. The polite term is serendipity, but when you're in the business, you understand that it's half desperation and half luck. Sometimes you learn more from the botched experiments.

Our training video had an old black-and-white skit where Don Knotts was dressed up like a nutty professor. He kept stumbling around, knocking over test tubes racks and spilling chemicals all over the place. An interviewer asked what he was doing.

"I'm trying to discover something by accident!" he squeaked.

"Class D Serendipity," a superimposed title noted, until the klutz tripped over that too.

We refined discovering things by accident to an art. Genie, our supercomputer, generated billions of genetic combinations, including the human genome, other organisms, and primordial mixtures of everything. The output was fed to a subsystem, the simulator, which would "grow" an organism to spec, and try to determine whether it was likely to have congenital problems that were "incompatible with life."

The simulator was licensed to kill. The more they improved it, the more potential life forms it eradicated. The beauty of it was, when a test subject failed, no one

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cared or even noticed. It was just data. Of course, Genie lacked the ability to make final judgments, which is why they had openings for real people. They loved med-school dropouts—kinda smart, kinda cheap—which is how they found me. Because of my hands, my parents thought I would make a good surgeon, but during my first visit to an ER, I discovered by (car) accident that the sight of blood made me faint. I was a good fit here at Good Fortune Genetic Design.

I only needed one more target, and I'd get two weeks off, so I went back to work, not caring how dubious the targets in my queue were. I'd promote the first decent one and get my butt out of there. I'd already discovered four virtual species of potential interest. No cures for diseases like my pollutant-associated mutation syndrome (PAMS), no missing link, or Bigfoot. But my teddy panda had promising marketing potential, my frog-hog's skin had useful properties for burn victims, and I have no idea what they might do with this squirrel monkey thing.

My call light came on, and the bell trilled my favorite guitar riff from "Love Slave." I jumped a bit, thinking that someone had already returned my promoted target, rejecting it. Then I saw the ID. It was a lady who used to work on our floor.

"Tina Peshj?" I said out loud. She never spoke to anyone while she was here, much less me. Why a call now?

"That cow is calling you?" That was Kaitlin, in the next cube.

I laughed at that. The other women said that Tina had an udder on the back of her neck. I think it was really just a clump of huge skin tags, but it did look rather like an udder. That's not why people called her names though. She was a bitch, and rumor had it that she had slept her way to a "comfy position" up in Special Projects. Who would actually sleep with that "cow" was beyond me—and I was pretty desperate myself.

"Yeah, it's Tina. Want to come check it out?" Any excuse to get Kaitlin to pay attention to me.

"I'll pass," she said. I was tired of hearing that. "Aren't you going to answer her?"

"Not for a five-dollar nickel."

I freely admit to being an asshole. I'm very loyal when it comes to friends, though I haven't many of those.

Tina's message asked me to come up to her office to see an unusual target she'd come across. I told Kaitlin that Tina just needed some help because she didn't understand how Genie worked, and I headed for the elevator. In fact, I was intrigued, partly because it was Tina and partly because I'd never been to Special Projects before.

Tina had actually asked me out once, when I first joined the company. I refused. I was queasy that way. It bothered me when she turned her head too quickly, because her blond hair would flip aside, and I'd see the thing on the back of her neck. She wasn't all that hideous when her hair stayed in place, though. I might have actually gone out with her, but by then, I'd heard of her reputation as the company whore.

I found her office on the fourth floor. Not where the bigwigs were, but definitely a step up from our prairie dog village. Here the halls had long lights that reflected off the ceiling and nice textured wallpaper that had a pattern of endless double helixes. Tina had a real office with a door and a window that overlooked the half-empty parking lot. I entered quietly, and Tina did not turn to see me right away. Her hair covered her neck. From that limited view, she looked like any other girl, and I wondered why she hadn't had that growth removed a long time ago.

"Hello," I said.

She turned. She wore jeans and a black T-shirt with a Led Ventrickle logo on it. No makeup. The only thing she had fussed over was her hair, for obvious reasons.

"I requested an image," she said, look-

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ing me over a bit, I think. "It ought to be finished any time now."

Sometimes a creature would be so strange you'd want to render a detailed image. Some of them were just *wrong*. So messed up, like the human gastropods. Or the saber-toothed rectal worms. But most of the time, they were hilarious. We'd all gather in someone's cube and laugh our heads off at the pictures. After a while, even the sick ones were kind of funny. We gave them stupid names, and then we'd get serious, and try to find something useful.

I looked her SmartDesk over, trying to figure it out. Everyone's is configured differently, but hers was pretty jacked. It was completely level, not inclined at all. You had to lean over it to see past the glare from the window. Then, instead of stacks of windows tiled up everywhere, there were only two windows open, plus her touchpad and tele. One window was her work queue—a single target—and the other was a folder labeled "Next Week," closed, with a virtual gargoyle paperweight on it. With so little, her monitor might as well have been an old upright.

"What have you got?" I said.

She dragged the target to flip it over, and the image appeared. I leaned over. It looked just as I thought it would, based on the data: Target 9381093—humanoid, hunchback, "slimb" (supernumerary limbs, non-Hedgehog protein) et cetera. The thing had two extra arms extending from a half-formed second collarbone on the chest.

What do you know, a four-armed freak. Just like me.

No, sorry. A natural-born surgeon, that's what I was supposed to have become. Well, I had the hands for it all right, but not the stomach.

At first I thought it was a joke, but none of my friends were smart enough to pull off a hack like that. I flexed my twenty fingers and stared at the familiar four-armed image. The face was not rendered, but mine reflected faintly on the desk.

"What do you think?" she said.

"It looks like me."

"Scary, huh?"

"What the hell is this thing?" I said. "I mean, why would it pop up like this?"

"I really don't know," she said, wrinkling her eyebrows in puzzlement. Then she looked at me—at my arms—awkward as it was. "Listen," she said, "why don't we go out and take a long lunch? We can talk it over."

"Well, okay," I said. "But first, I've got another idea. Let's go ask Swami."

Upstairs there was this guy, Ben Lebinsky, who everyone called Swami. Wheelchair bound, smart, independently wealthy—we all wondered why he bothered to work. Usually no one talked to him because he could be a real SOB, and you never could tell what he was thinking. But sometimes people are misunderstood, and I once had a good conversation with him about botany, of all things.

Swami was in his office, which, like Tina's, had real walls and a door. The door was open, and Swami had his back to us. He was staring at his desk. On his window shelf were several bonsai trees, and a huge picture of a strange tree hung on his wall. It didn't look like a real tree, but some kind of fantasy thing. A caption said, in a green vinelike font, "The Healing of the Nations." There were other posters, too, done in throwback style. One had a gray Star of David made of heavy chain links on a black backdrop, with the cryptic title "80,000 Careless Ethiopians" in red. The Jewish symbol and obscure African reference made a curious combination. Another depicted a musical score, but when you looked close, the music was made of tiny DNA strands. You see a lot of DNA motifs around here, but otherwise Swami was a unique character.

"Hey, Swami. I'm Jimmy Tanner. This is Tina Peshj."

He turned his chair halfway around, apparently unable to move his neck much. As soon as I saw him from the

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front, I remembered that he had cerebral palsy. He sat in his chair, head cocked, arms bent oddly, making me self-conscious of my own extra arms. He was about thirty, and had long, stringy black hair.

"Hey guys," he said. His head bobbed a little when he talked, and he seemed friendly enough. "One Tree. What can I do you for?"

"Tina came across a weird target today, and we thought we'd see what you made of it."

"Genie moves in mysterious ways," he said. I knew he was brilliant, but I didn't know why he pretended to be so superficial. "What 'cha got?"

We hadn't brought an ID for him to look up, but described the six-limbed target.

"You found Spider-Man," he said, sounding very serious. Then he chuckled and lifted a bent wrist in my direction. "Your cousin!"

"It seems like a pretty big coincidence," I said.

"There's a difference between irony and coincidence," he said with an air of condescension.

"Whatever."

"Maybe someone wanted Tina to come to you."

He tried to be friendly again, but I didn't buy it. A smile faded. "So," he said, "what are you going to do? Are you going to pass that target to the next round?"

"I don't know," said Tina, looking at me with uncertainty.

"Why would anyone go to the trouble of forging a target, just to get me and Tina together?" I said.

Tina scrunched her face in disgust, and Swami put an upright finger over taut lips. "I don't know," he said, turning to Tina.

"Don't look at me!" she said.

Her face was getting red, so I decided to change the subject. Not that I don't like seeing people squirm, but in her case, I'd rather see it in private. "So what's with the trees?" I said.

Swami smiled genuinely this time. "I just love trees," he said. "Did you know they have their own missing link?"

"No . . ." Sorry I asked.

"Man descended from some early form, and there are missing pieces to the puzzle. If you think about it, the same is true for trees. They didn't just start out tall like that. They had to compete for sunlight with other plants, and different ones grew taller and taller. Still, the species are more similar than different, losing their leaves at the same time and all that, so there must have been common ancestors to modern trees. Maybe only one ancestor. The One Tree."

I studied the tree mural on his wall again. It was a computer-generated image. The trunk was not straight but curvy, and the branches made it look like a bonsai—artistic, with oversized leaves. The leaves had wide, pointed fingers, with serrated edges.

Swami saw me studying it. "I'll leave it as an exercise for the student to figure out the species of The One Tree."

"I think I get it," I said. "You're rich, but you work here because of your interest in botany. You are using Genie to help you find your missing link, aren't you?"

He smiled and nodded in approval. "You're on the right river. Let's leave it at that."

Tina swung her arm back and forth at her side. "Okay. Thanks anyway."

I took Tina to lunch. That was the first date I'd had since starting the job and only my third since dropping out of med school. I actually hadn't dated that much during college either, partly because I was too busy and partly because my mom never liked any of the girls I dated. There were two reasons they went out with me, she said. Either they did it out of pity for me, or else they were deformed themselves.

"It's nice to have high standards," I once complained to her, "but what the

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hell do you expect? I have four flipping arms, for God's sake."

"They'll make a nice girl very comfortable some day," she said.

That's a mother for you—definitely not of this world. My dad was the opposite. He once advised me not to get married, but to always try to have affairs with married women. The theory was that if they were already married, they wouldn't demand a commitment. Up to then, I thought my parents had been a happy couple, but I guess they were just stuck with each other.

"Your mother and I were raised to be happy and independent," Dad explained. "Not values conducive to marriage, when you put them together. Thousands of years of family values and silly love songs, undone by one generation who thought it knew better!"

I felt really sorry for him, but he punched my shoulder and winked at me.

"Thank God," he said with a chuckle.

Lunch with Tina was okay. We took the rail to a place on the other side of town that neither of us had been to. It was a New York-style Italian deli, and the obviously Italian New Yorker that ran the place was constantly yelling at all the obviously non-Italian immigrants that were carrying on his family legacy for him. No table service, so we had to wait at the counter while they fixed our orders. I had a pepperoni roll smothered in sauce, and Tina had a dish of some kind of pasta casserole. We went to sit by a mural where the Tower of Pisa threatened to collapse onto our lunch.

I hadn't expected romance; neither of us are that type. That's for perfect couples, of which there aren't any. Some myths have outlived their usefulness. I did have the feeling that she was checking me out, though. She confirmed it by mentioning my arms.

"Why don't you have them removed?" she said, locking her eyes to mine.

I forced a little laugh. "You're a blunt instrument, aren't you?"

"I wasn't born a bitch," she recited. "It's men like you that made me one."

That made me laugh for real. She smirked with satisfaction.

"Well?" she said. "Don't the arms get in the way? I can't imagine they were any fun to grow up with, and I should know."

"Kids used to pick on me. Seriously, the first time I asked a girl out, I wore shin guards, in case she tried to kick me."

Tina laughed. "I'm still wearing my shin guards. Not literally, but you know what I mean."

I did. My shin guards had become the cynical façade I put on every day. But the kicking still hurt.

"My parents said my arms were a gift," I said. "You know, like I was deformed for a reason."

Tina laughed out loud. "Gawd! How stupid can people be?"

"I know. A gift, right. My mom thought that with four arms, I would be a brilliant surgeon. How she thought a pair of useless claws could perform surgery is beyond me."

Her eyes had a twinkle in them. "Well, couldn't they hold the clamps or something?"

"That's exactly the sort of thing she used to say. It was ridiculous."

"Are your parents still around?"

"They both flipped off a couple years ago."

She didn't say she was sorry to hear that, because she wasn't. There's nothing more sickening than fake emotions. "So now you can get rid of the arms."

"Oh. I don't know. I'm just used to them, I guess." She had a point though, getting me thinking that I sure didn't need to keep the damned arms just for my parent's sake. "Why don't you get your growth removed?"

I tried to lock her eyes, they way she had done to me, but this time she looked at the floor. "I'm afraid to."

"Why?"

"I don't really know. My parents were, so I am too."

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"Do you think they had a good reason to be scared?"

"I think my parents thought something bad would happen to me, like I'd lose my strength. Maybe there's a hormone secreted."

I made the shape of a letter omega, my hand approaching one ear, arcing over my head, and out the other ear. She'd gone over my head.

"You know, like Samson," she said.

"Samson. Wasn't he some old super hero?"

"Yeah. When his main squeeze cut off his hair, he lost his strength."

"So you really don't know why you shouldn't cut it off," I said as I got up to dump our lunch trash.

"No."

"Then why don't you?"

"That's a dumb question," she said. "Just who would take care of me if something went wrong?"

"You have friends, don't you?"

"If only. Do you know how hard it is to take care of someone when their health is really, really bad? I don't have those kinds of friends."

"Well, maybe there's nothing that's going to really happen."

She looked at me with disdain. "Well, maybe there is. What's with you anyway?"

"Why don't you ask your parents?"

"Why don't you leave me alone? No one has heard of my mom in years, and my dad's in jail." She pushed the table away enough to fold her arms in defiance.

"Perfect," I said, not letting her get away with that. "So we'll start with your father."

"You're such a jackass," she said, failing to suppress a smile.

"No comment."

"None taken." This girl was good.

"I'll pick you up Saturday morning," I said.

Prisons haven't changed much since those old black-and-white movies. The prisoners are still low-lifes, the walls are still bare and smell of painted cement, and the wardens are still ugly people, most of them. Tina's dad was in that kind of place, not one of those white-collar suites. He had been caught hacking a government system, she told me on the way there. It wasn't a habit of his to break the law, but when you do something innocuous in the wrong place, it can be a federal offense. Like saying the word "hijack" too loud on a passenger jet. Her dad, Tyler, got himself fifteen years for peeking at the personnel folder of his boss at Homeland Security. That was the story, anyway.

We were scanned and taken to a visiting room. Tina was very anxious. She kept fixing her hair. I couldn't tell whether she was excited or disgusted to see her father. She hadn't told me so, but I could tell there was something more than his conviction between them. Tina sat in a hard plastic chair with metal legs, along a wall with a thick Plexiglas window, like banks had. The hole to talk through was made with clear baffles, so you couldn't make contact or pass anything through. I stood behind her.

Presently, her uniformed father was escorted to the other side. Tyler Peshj was a man of average build, with greasy brown hair that was combed to an artificial perfection. He looked to be about fifty, but had a worn expression that was littered with the scars of acne. When he saw Tina he perked up. The escorts let go of his shoulders and departed through a back door.

Tina had completely dropped her bitch persona and was trying not to sob. "Daddy," she said.

"Christine. It sure is good to see you."

To avoid further sentiments, she quickly introduced me as "just a friend." Then they didn't say much to each other for a while. It was more like they were caressing each other with words. Nothing mushy at all, but it was the way they spoke, the way they looked at each other.

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Tina looked uncomfortable, and she said, "Jimmy has a computer question for you."

"Yes, sir," I said, surprised at my politeness. I must have been trying to put some structure to my own discomfort. "We work for Good Fortune, as you probably know, and I was wondering whether it would be possible to hack into the computers." I outlined the situation of the four-armed target, and trailed off, not knowing how much detail Tina's dad needed.

"Not a problem," he said without a thought. "Might take time, is all."

"Okay." I hadn't prepared anything after that, and his answer was too easy.

Tina wanted me to keep talking, and she was still fiddling with her hair. Tyler looked at her, pretty much ignoring me. "Why did you come here, honey?" he said.

"Daddy," she said, faltering. "It's just that I was thinking of having this removed." She breezed a hand halfway to her neck. He knew what she meant.

"I'm surprised you haven't done that long ago."

"Really? That's funny, because I remember that Mom was really scared to do it. I always assumed that there was a good reason for that."

"Of course there was a good reason. Your mother was an idiot."

"Where is she now? Do you know?"

"Not a clue, kiddo. If I were you, I'd stay away from that woman. Then again, I wouldn't blame you for looking her up. If you do, don't tell her where I am, okay? I got nowhere to hide."

They talked a little more, and Tyler tried to be polite and ask me a few questions. He obviously thought Tina was bringing her man to meet her father, even though we both denied it. I couldn't tell whether he was happy or indifferent about the idea.

Time was up and the escorts returned. Tyler looked hard at his daughter. "I have one last question for you," he said. "Can you promise to tell me the truth?"

She made a fake smile and then sneered. "I love you too much to lie to you, Daddy."

"Oh, then this will sound silly," he said, mimicking her sarcasm. "Do you hate me?"

"Of course I do."

Then something very strange happened. Tina must have blushed, I thought, because her cheeks became really red. Tyler sat up in his chair and drew close to look at her face. She realized something had happened and turned away from him. Then I saw it.

Her cheeks each had a bright red heart tattooed on them. It took me a minute to figure out what it was: mood makeup. She never wore makeup that I'd noticed before, but there was no mistaking this. Mood makeup is some gunk that reacts to your skin temperature, or electrical resistance or some jack like that. It changes color depending on your mood.

She was so embarrassed that her chair fell over as she got up. She gave me a shove toward the door, the metal chair legs clattering loudly on the floor.

"Come on!" she said. "Let's get out of here."

I shrugged with my hands to Tyler, who just sat there perplexed. "Aren't you going to say good-bye?" I said to her.

"Good-bye, Daddy," she called, holding her hair in place. She didn't turn back.

We stopped at the bank to make a withdrawal on the way to the clinic. While waiting in the car at the drive-through, I learned that the rumors about Tina being the company whore were all lies. She hadn't slept with anyone. I believed her; guys spread those kind of stories when there is a girl that they think somehow threatens their sexuality. They do it when someone is so hot that they all want her, but can't have her. And they do it when someone is so unsavory that they're embarrassed to admit that, yes, there are females out there that even

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their super-libidos must reject. So they spread lies, to create the illusion of legitimacy to their rejection. I figured that one out from being rejected so often.

People buy into it, too, even other women. I'd heard Kaitlin call Tina a cow, for example. That was her way of fencing off the livestock from "real" women, so that guys could more easily tell which side she was on.

It was hard to find the clinic because it wasn't on any of the computer maps. Those places that are "guaranteed 100% sterile" don't usually want to be listed. After missing several turns, we found it—a dubious establishment in the low-rent part of town.

Before I was born, the spiraling costs of health care nearly bankrupted the country. They had a big depression. People tried to socialize health care, but couldn't quite pull it off politically, so for over twenty years, we've had a hybrid system that doesn't work at all. You can't get good care in the government facilities unless you're uninsured, and you can't get good care in the private sector unless you're rich. Of course, insurance was one of the causes of the problem in the first place.

Another cause was pollution. A lot of kids were born with defects, like Tina and myself. After a few business, were flipped off by lawsuits, a law was passed that basically let the others off. Too many would be put out of business, which would throw things deeper into economic ruin. They were still working on it, but at the time, a lot of middle-class people went to unlicensed clinics.

The people we met were just in it for the money, and since the job didn't pay them well, they had pretty poor service. I could tell by the way they treated Tina that they didn't believe in what they were doing anyway.

I waited for over an hour, until a semi-professional nurse brought Tina out of the operating room. Tina had a white towel wrapped around her head, held in place with a pink Velcro strap. It looked like she'd just come out of the shower, and I didn't see any blood at all. This nurse, a black lady with an African or island accent and a badly repaired harelip, was the one person who seemed to care about Tina. She gave us painkiller and antibiotics, instructions for care, checked one last time for bleeding, and saw us to my car.

"How do you feel?" I asked.

"If only you cared."

"Of course I care. Otherwise I wouldn't be here, would I?"

She gave me a strange, pained look.

"Does it hurt?"

"The muscles in my neck are sore." Tina exhaled a big breath, as if she'd been holding it all these years. "Wow," she said. "I can't believe I just did that."

I took her to her apartment, offering to stay for a while. I'd have spent the night on the couch if she'd wanted, but she would have none of that. I'd seen how vulnerable she could be, but she was a proud lady, that one. She barely thanked me for helping her, as if that would somehow compromise her independence.

"Do you mind if I check on you?" I asked.

"No."

Then, as she chained the door behind me, she opened it as far as it would go, and called me through the crack.

"Yeah?" I said.

"Sorry about the mood makeup."

"Well, I'm not sure, but I think he appreciated it."

"You're really dense, aren't you? It was meant for *you.*"

She slammed the door in my face. There is nothing more confounding for a guy than having a door slammed in your face, except maybe a slap in your actual face. With the door slam, you know you have to get back inside to overcome the insult, but you also know that you should let it go. It could have been classical drama, me yelling at her through the door like in some old movie. Only it wasn't, because I'm not dramatic. She

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slammed the door in my face, so the hell with her.

Neither of us would apologize, so we went on for a while like we were just coworkers. I sometimes had to keep my distance. While she had always been a bitter pill, she now seemed more acerbic, more in your face. I supposed that with the healing of her amputated growth, other scars were itching. I decided to let things cool for a while.

As it happened, Swami sent us both an interesting e-mail, and we met in his office to discuss it. Tina wouldn't talk to me, and I only granted her a nod. I'd be damned if I was going to apologize to her for not being able to read her mind. You don't slam doors in people's faces for that.

"One Tree," Swami said, apparently as a greeting. He backed his wheelchair into his office, and we sat in chairs to either side. "I think I figured out what's going on with your four-armed target. But first, I have to ask you something. Either of you ever smoke herb?"

"No," we both answered, both taken aback. It wasn't the sort of question you asked someone at work. "What's that got to do with anything?" I said.

"You may recall," he said in an exaggerated haughty voice, "in our last lesson, that I spoke of the One Tree, so you know what that is."

"The missing link of trees, right?"

"Correct-o-mundo. What I didn't tell you was that the One Tree might as well be mythical at this point. I've done a lot of research, and I think it's too far removed genetically from anything alive today to ever recreate."

"I'll bite," I said. "What's the missing link for marijuana?"

"Hey, I like you. You're sharp!"

"I got talent, sidecar."

He chuckled. "Anyway, you're on the right river. I can't recreate the One Tree, as I used to think. But I'm onto one of its descendants: Sinsemilla, the mystical mother of Mary Jane. She's attainable, and her medicines hold many cures."

I made spooky fingers and went, "Whoo!"

"Shut up, jerk," Tina said. "I want to hear what Swami found out."

"So you're in?" Swami said to her.

"In what?"

"My little club. There's too much research for me to do alone. Anyone who helps me reincarnate the ancestral herb will reap in like kind."

"You must be smoking the good stuff," I said.

"Funny," Swami said with a bemused smile. I liked Swami, because he tolerated me. People often fight back, which just tells me that their ego is threatened. Swami had his act together, and I respected that. "Think about it. Man's been growing and smoking herb almost since fire was harnessed. So herb evolved along with the human brain, in symbiosis. As man became more conscious, he needed herb less, so Mary Jane became relatively barren. And we became less spiritual."

"Whoa."

"Today's herb is weak, giving only a bit of euphoria. But Sinsemilla, now, she would restore man's full consciousness, a direct link to the original spirit breathed into the Garden of Eden. I don't expect you to buy all that right away. But if you want to help, hey!"

"I promise, I'll think about it. Now what about Tina's target?"

"Fair enough," said Swami. He paused for effect. "It's a test signal."

"A test signal."

"It's sort of like calibration. One way to do science is when you know the result you are looking for and set up a careful test for that result. But sometimes that so-called methodical purity is impossible to achieve. In our case, we don't know the result at the outset, so we can't afford to ignore data just because it isn't rigorously attained. Our management needs to make sure that Genie identifies the targets that he should, and then they need to make sure we report

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them properly. So they inject an artificial target into the raw data. A test signal. The real rigor of our process happens at the back end."

"Test signals." Tina was uncertain. "Testing me, you mean."

"Partly, yeah."

For once, someone said something about that four-armed target that made sense. Since it was no coincidence that it hit me so close to home, it had to be that someone had deliberately planted it. Until now, I just could not figure out why. This was some kind of ethical test.

"So what should I do?" said Tina. "I mean, should I tag it for follow-up or trash it?"

"I wouldn't worry about it."

"But what's the right answer?"

"Not your problem. Your job is to identify Genie's best targets. It's up to someone else to be critical of your choices. The old scientific method was too critical up front. By the turn of the millennium, this negativity, posing as critical thinking, was killing science by feeding anointed lab coats and starving creativity."

"I don't know. I don't want to do the wrong thing and blow my chances at my new position."

"What chances? If you had a chance, would they treat you like a cog in a wheel? Allow me to quote Neville Livingston, aka Bunny Wailer. 'We aren't organizations, we are organisms.' All these corporate types are part of a system, and a system doesn't care about its parts. They're replaceable."

"Oh yeah," I said. "Stupid of me to forget that. See ya."

"No, seriously. If someone treats you like part of an organization, they don't care about you. If they treat you like an organism, then they do."

"That's actually true," Tina said, smirking at me.

Swami beamed. "Of course it's true. If you don't believe me, go check out who's on the board of directors."

"Yeah, yeah," I said, turning to go, making praying-Gandhi hands. "See you around, Swami."

"One Tree," Swami said, waving over his head as he rolled to his desk.

"Thank you," Tina said to him. Then she followed me out. "Good God, get me out of here," she muttered.

If Tina was being tested, why did the target resemble me? Was it originally intended for me? Did Tina's promotion have anything to do with it? Swami had put us on the right river, but we still didn't know much. I was damn well going to get to the bottom of it all, though.

Something else Swami said had made sense too, and when I got back to my desk, I looked into the company's board of directors. There wasn't one. The shareholders had voted to replace the old board with a computer. At the time, it was pretty controversial stuff, so it was not hard to find information on it.

The idea was that today's business environment—which included local policy, local and federal law, oversight by several agencies, high investment costs, high risks, insurance nightmares, and more—was too complex a maze for humans to negotiate quickly enough to turn a profit. With a highly adaptive program tracking the myriad variables, creating and simulating strategies, the company had turned around and was four times more profitable than our nearest competitor. The owners plugged in the broad business goals, and let the machine figure out how to achieve them. For example, that's how the current quota system got started. The board figured out that the way to maximize profit was to focus on certain metrics, such as the worker productivity measured as a ratio of qualified targets per month. It didn't matter that there was nothing we could do to generate the targets—it was just a way of pulsing the company's efficiency.

There was a management team that directed operations from this output. In that, they had a lot of leeway, but if the company fell short, it was that team that

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was fired, not the computer. All that made some sense of Swami's warning about being treated like a machine part.

In a rare excursion, I went to my boss's office to ask him about it. Dave Deale was a handsome guy, brown hair with graying temples. Deep, commanding voice. The kind that did well in front of customers, but not necessarily his employees. He was broad and muscular, but hobbled from some football injury, like he had blocked a field goal with his butt, and they never got the ball out.

"In the final analysis," Dave said, after I asked about the board, "our company is just another flavor of mint."

"I don't get it."

He smiled at his private joke. Some people are like that. They amuse themselves, and if no one else is amused, they are amused even more. "I mean the kind of mint that makes money. Of course we don't print it; it's all just numbers. But we're nothing more than another kind of money-making apparatus. Another flavor of mint. See?"

"Yeah, Dave, now I get it. Doesn't that make you feel like a cog in a wheel?"

"What do I care? I get paid, just like you and everybody else. Sometimes I'm proud of what we accomplish around here." He shrugged. "It's a job. Then I go home to my family, my kids climb all over me, and I'm someone important to them. You ever take a kid to Disney?"

I shook my head. Actually, I'd been one of those kids taken to Disney, when I was written off as a terminal case. I hated it. All those fantastic things to look at, but nothing was real—you couldn't even touch most of it. It was a great monument to the imagination—but whose imagination? Whose dream was to take a vacation with a bunch of afflicted seven-year-old biological losers? Not mine, that was for sure.

"I forgot, you aren't married," he said. "You won't find much love at work, 'fraid to say."

"You got that right." I left his office, trying to find my way back to Walt Real World.

I made an overture to Tina via e-mail, asking what she was going to do about her four-armed test signal. She made a brief reply that basically said it was none of my business. "Bitch" was my single-word response, to which she returned, "XOXO." I was going to reply "Same to you," but hesitated. Tina wasn't as introverted as she was when I first got to know her. Before her operation, I don't think she would have e-mailed things like that.

Something about that new assertiveness attracted me. If she was out to stick it to the world, to make them pay for the way they treated her, I wanted to be there to watch. We didn't have to be lovers, but we didn't have to be enemies either. She must have been thinking the same thing because after a couple of days with me not e-mailing back, I received another message from her.

She asked me to dinner and a movie. I made her promise not to slam any more doors in my face, and she went along, joking that she reserved the right if I called her a bitch or a cow. It was nice, the two of us having a laugh like that. Nothing like reminiscing over old insults to break the ice.

Dinner was okay, the movie sucked, and then she said, "Don't take this the wrong way, but do you want to make love?"

I laughed. I was into that. Since her neck healed, she actually looked hot. I made villain eyebrows, rolled a make-believe mustache in my fingers, and said, "My place or yours?"

"Not tonight," she said. "There's something you need to do before the rubber hits the road."

"I'm all ears."

"No, you're all arms. Lose two of them, and I'm yours."

I stared at her. She was all veneer. I hadn't learned to see through that yet, and until now, I hadn't wanted to. "You're serious," I said.

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"Completely. I had my neck fixed because of you, so now it's your turn."

"That was just cosmetic surgery. Arms, that's a whole different animal."

"Exactly. And I'm not going to make love to an animal. To be honest with you, Jimmy, I don't think anyone else will either."

She had a point there. I instinctively clutched my smaller hands together, which was about the extent of their range of motion. They had good feeling though, and when they held each other, the damn things felt precious. I hated them.

Tina had me wanting her right then, but I wasn't going to be manipulated like that. So I abruptly called it a night. No door slamming though.

I had recently made my semiannual quota at work, so I had two weeks coming to me. I had entertained the idea of asking Tina to go on a trip with me, but I wasn't sure I could stand her for that long. But two weeks might be about enough time for a double amputation. Maybe it was time to get those meat hooks out of my life.

Cutting off your extra hands is like buying a new car. Once you make the decision to do it, you can't get your mind off it until it's done.

I'd chosen the government hospital because of the complexity of the operation. It wasn't like having a giant wart removed from the back of your neck. Besides, it would cost a lot less this way, and if something went wrong, I wouldn't have to worry about suing anybody; the government would make good. They always did—not millions of dollars for pain and suffering, but enough to keep people happy. The alternative for them would be to admit that the social program was a failure, and there were plenty of political machinations to prevent that from happening. It's funny how nothing fails anymore.

Tina played the role of sympathetic friend, but I could tell there was more to it than that. I didn't fool myself into thinking she really liked me, but it was tempting. Love is dead, but it still haunts this pitiful world. Hell, Tina herself was the one who got me listening to the new "love is dead" stream, and though anyone can care for someone else, there's always something else behind it. I was nervous as hell and was grateful for her being there, whatever the reason. My eyes couldn't focus on the paperwork, and she was almost eager to help me get through that.

I had a perverse idea to keep my arms in a jar of formaldehyde, as a souvenir, but she talked me out of it. "You should donate them to research," she said. "It's your moral obligation because they might be used to advance medical science and help others in need."

"Since when did you care about others in need?"

She just gave me a fake hurt look. Anyway, I signed the forms, just to get on with things.

We were both quiet while I was being prepped. When the nurse moved out of the way, I saw that Tina was looking at me intently. I thought maybe she was worried about me, but then she said, "Do you mind if I use you in one of my stories?"

"What stories?"

"I write dark fiction, mostly horror."

That was news to me, but it did sound like her. A hint of post-Goth. She seemed like the kind who would write for therapeutic reasons. "What's the story about?"

"It's about these Siamese triplets."

I stifled a guffaw.

"I know," she conceded, giggling. "Asshole."

"I'm sorry. Seriously, go on."

"So this one triplet—the most viable one, the one in the middle—decides she's had enough of her parasitic sisters, so she kills them in their sleep."

"Ouch."

Tina smiled a wicked little smile and giggled again. "It gets better. So she has to, like, carry them to an unlicensed

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chop shop, which is really hard to do, of course. She pays some flapjack doctor to cut her dead sisters off. So he does, and everything goes fine, until the sisters start haunting her. They're like phantom limbs, you know?"

"Like when a person loses a leg, but it still itches?"

"Exactly. Except the sisters don't itch. They beat her up, over and over. For real. They do other nasty stuff, too, but I don't want to give it away."

"So what does she do?"

"There's nothing she *can* do. She's too much a coward to kill herself, so she just lives like that for the rest of her life."

"That's really scary," I said. It was, but what I was thinking was that Tina was pretty scary herself. Given the way people treated her for her entire life, I couldn't blame her.

"You really think it's scary?" Tina smiled again. "Thanks! Don't tell anyone about it, though. You're the only one I've ever told one of my stories to."

For once I knew a real smile on Tina when I saw it. It was a good feeling, to have broken her veneer, and it was a good time for that to happen. I immediately forgave how inappropriate her story was, under the circumstances.

"I won't tell anyone," I said. "But what's that story got to do with me?" Well, I'd *almost* forgiven her.

"Nothing, really. Your arms gave me the original idea, that's all."

The nurse returned and chased Tina out. They wheeled me to the OR, where I thought I would count down to unconsciousness, but I fainted the moment the gurney bumped the doors open.

I had disturbing dreams. My parents were conjoined twins, literally joined at the hip. Then I was born, but not the normal way. I grew from them like another parasitic twin. Even growing up, I was still attached to them. The three of us were fused in a big, grotesque lump. After Mom and Dad died, they were still there, dried up and shriveled. I had to carry them around, one on either side, no matter where I went. And they were like those phantom limbs, itching and aching.

I remember waking up and falling asleep several times, looking at the recovery room ceiling. I lay there, very still, mad at myself for being afraid to look at my chest. One night I awoke and lay there a long time, building up courage. I tested my good arms and found I could pull them out of the sheets. They looked normal, and I turned them over and over. Then I put them firmly at my sides, afraid to let them get near my extra arms. I didn't want to feel that they were there or that they were missing. *In the morning,* I told myself.

That night I was dismayed to discover my parasitic arms still attached. They started to move by themselves. They tore off some bandages and pulled down the sheet. I tried to sit up, but they slammed my chest back down. Then they began choking me. I couldn't breathe, and even my normal arms could not pull those wretched things from my neck.

It's horrid having nightmares when you're alone.

Tina never came to visit, which I thought strange, and I didn't call her either. I was the patient, damn it, and I wasn't about to call anyone for sympathy. I was in the hospital for almost two weeks, which seemed like forever, especially when you have to eat crap like Honey Smackerels every morning and dry soy burgers every night. All day, every day, I suffered through a marathon of a British soap opera, "Bag Enders," on the Hobbit Channel.

The doctors removed the bandages and showed me my new chest. The parasitic arms were gone for sure. They had done a good job of covering up the holes, and once the scars healed, you might not even notice. It felt strange to touch the scars where my little crooked arms had been. I had mixed feelings,

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since they had been a familiar part of me. It hurt to touch there, which proved that I was wounded, as opposed to healed. My upper chest was now flat, like a normal person, and that made me feel a way I had never felt before: like a man.

I marveled, my fear mostly gone, and wondered what my parents would think if they could see me. I liked to think they'd have been pleased to see their son looking normal for the first time, even if it meant I would finally never be the super-surgeon they had once imagined.

It was nearly three weeks before I could return to work. I'd overextended my leave and now owed the company some time. If I accelerated my quotas, I could make up for it. It felt good to be back in the office, and I got a sense of what Tina must have felt to go in with her growth removed. I felt taller and more confident. I walked right by Kaitlin's cube and sat at my desk, as if nothing was different. I wanted people to remark to me first, rather than me parading myself around. I sat and caught up on some things. Midmorning, my chest started to ache. It hadn't hurt like that in several days.

No messages from Tina. At break, I went up to at least pass by her office. She wasn't in. I didn't want to ask about her, but when I happened on another coworker who had been promoted to her floor, I asked anyway. Apparently Tina had been granted leave, but was overdue getting back.

It was serious enough that I convinced someone to call the cops. The police turned up nothing in her apartment. Evidence was that she'd left. Her car was gone, and her bank accounts showed a big withdrawal that suggested a trip.

I felt abandoned by Tina, just when things between us might have taken a good turn. My chest ached more often, and while the two wide surface scars below my collarbone were healing, there was some swelling.

I had a recurring nightmare that phantoms of my discarded arms were trying to strangle me. I'd wake up, and my chest would hurt. I called in a couple times, but the doctor said pain was normal at this stage and that the dreams would eventually go away. Amputated limbs itching or aching was normal, too, he said, but I wasn't experiencing that.

Another week passed, and I began to really worry about Tina. That was when I received an e-mail from her.

JIMMY ~ HOPE YOUR OK. SORRY TO LEAVE WHILE YOU HOSPITAL, BUT I HAD TO GET AWAY. I DID SOMETHING VERY BAD TO YOU AND I'M SORRY. ITS MY FAULT, BUT MOSTLY THE COMPANY. YOU CAN SUE THEM FOR A BRAZILLIAN DOLLARS. I'M SERIOUS YOU CAN PUT THE BASTURDS OUT OF BUSINESS FOR CANNIBALONIALISM. THEY KNEW ALL THE TIME AND ONE TREE WAS ON THE RIGHT RIVER TOO. TEST SIGNAL WAS TO SEE IF I WOULD AND I'M SORRY I DID IT. ~T

It wasn't from her company address—there was no return address—and it wasn't signed, but it had to be her. My arms were gone, and so was Tina. What the hell was going on? Whatever it was, I had to do something. Getting a lawyer seemed like the thing to do, but I needed advice from someone I could trust.

The state penitentiary welcomed me with iron bars.

"Well, well!" said Tina's dad, eyeing me through the Plexiglas.

"Yeah," I said, still self-conscious. "I had them cut off."

"Good for you."

"Tina cut her growth off too."

"How does she look?"

"Oh, great."

He didn't know she was missing, so I told him. I handed him a copy of her message and watched his face for reaction. His best guess was that she had gone off to find her mother. It made sense, especially if I was right about her having more self-confidence lately. As to where her mother was, he had no idea. We ran out of visiting hours talking and

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arranged another meeting. Since he was in a hacker's prison, he wasn't allowed computer access, so we couldn't correspond by e-mail. Phone was okay, but monitored, and we decided to just meet in person.

By the end of our third meeting, Tyler (as I called him) slipped me a closed envelope through the window slot. He was allowed to do that. I took it, and he held up a hand to mean not to open it yet.

"Are you a religious person?" he said.

"Well, a little." Right, if they still made pennies.

"Me too." He winked.

"Tina has disappeared," I said to Swami in his office. "I think she's in hiding because the company is after her for some reason. It has something to do with me. I need your help hacking into Genie to try to figure out what this is all about."

I filled him in and showed him Tina's message. He nodded sympathetically.

"I can't help you in any case," he said, "because I don't have a clue how to hack into the computers around here. I'm not smart enough."

"What if we had help from someone who can do it?" I told him about Tina's dad and his reputation as a master hacker.

Swami turned that over and looked up at me from his wheelchair. "Maybe," he said. "One condition."

"What?"

"If we get in, you help me target the mother herb."

That figured. I stalled, my eyes falling onto one of Swami's tree posters. "Hey," I said, "do you like that new tune by Got 2B Shvat?"

"Who?"

"You know, the Hasid Rock group? They have a big tree on their video. Shvat is some kind of Jewish arbor day, isn't it?" Blank stare. I'd been curious since I first visited Swami's office, and curiosity got the better of me.

"I don't know."

"So . . . you're not Jewish?"

"No." He smiled a deliberately mysterious smile. "Rasta Nova."

"Oh." That made sense of all this obsession over drugs, Jah being the god of marijuana, and all. "Too bad. The 'I've got friends who are Jewish' card might have come in handy to play some day."

"Jimmy, you're a jerk."

I bowed facetiously, then agreed to help him find his almighty weed.

The trouble with Tyler helping us hack into Genie was that he was imprisoned for hacking. The whole place was set up to deny him any kind of online access. All lines in and out were screened, and he wasn't allowed to have a computer of any kind. His phone calls were monitored, his mail read, and I don't know what else. The plumbing was isolated, so that signals couldn't be transmitted through the pipes or the water itself. The only places he had any privacy were in the bathroom and the chapel.

"The law provides for privacy of religion," he said, "so there's no monitoring in prison chapels. I bribed the company that supplied the windows."

Swami and I called up Celia, a woman named on the note Tyler had slipped me. She was a craftswoman who made the stained glass windows in the chapel. Moreover, she was part of Tyler's little crime syndicate, and the windows were part of a larger plan that revolved around his being able to hack systems from prison. They weren't ordinary windows. They had a layer of some kind of thin gel with unusual properties. The gel would compress slightly when hit with sound waves, which made it change color. Thin film interference, she called it. "It's actually a rather old and crude technology," Celia told Swami and me. "A poor man's secure receiver."

Another property was that the window glowed briefly when hit by light. A computer-controlled laser could draw letters on the window. Tyler would read them, and they'd fade away in a few sec-

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onds. This apparatus provided two-way text messaging, leaving no artifact in the prison.

Celia and Tyler had conspired to rent an apartment that was in the line of sight with the prison chapel. The idea was that Tyler would pretend to pray, and a telescopic color analyzer in the apartment would detect the color changes in the special windowpane. It then translated the changes back into sound, and we'd hear what Tyler was saying. Then we could laser messages back to him. Or plug into another system at our end, and Tyler could operate it remotely from prison.

"It gives a lot of deniability, because there's no direct linkage," Celia explained. "It'll be really hard for anyone to even figure out what we're doing."

"Why?" said Swami. "The Pentagon used to have countermeasures for this sort of thing. They were afraid spies would read the vibrations from windows of rooms where classified meetings were taking place. They'd have radio speakers up against the glass, to wash out the vibrations from the voices."

Celia smiled knowingly. "You've done some homework. But I don't think the prison will be expecting that sort of technology. They've been too busy worrying about subcutaneous nanochips and wireless sets hidden in tooth fillings. This ancient history stuff is mostly forgotten. We could have tried reading direct sound off the glass, but using light turns out to be better, and it gives two-way communication."

Tyler had already used this system to hack around some, and was keen to try something bigger. Swami was no hacker, but he knew a lot about Genie, and the other systems in the company—the ones used for e-mail, networking, and all that jack. With a little help from a master, he could be dangerous. We were ready for some test signals of our own.

The eighth-floor apartment was dark and almost totally unfurnished. A single table lamp sat on the floor with a dim fluorescent tube and no shade. There were a few water bottles in the musty fridge, and cheap blinds on the window facing the prison. Two devices sat on heavy tripods by the window, the laser and the telescope. I couldn't tell the difference between them. Some notebook computers and other stuff sat on two collapsible tables, all connected together by a pastafest of wires. Celia explained that they never went wireless on this kind of risky job. Closed circuit was much safer.

According to plan, Tyler went into the chapel, turned on the lights, and started to pray. Swami, Celia, and I sat in the darkened apartment, the scope trained on the chapel window and wired into the color analyzer. Celia showed Swami how to jog the scope around a little until he found the most active spot. We recorded some very clear color changes, and the analyzer showed a lot of structure not visible to the naked eye. The modulated frequencies were translated into audio, and Tyler's voice rang tinny out of a speaker.

"Test prayer number nine, number nine, number nine . . . For score and seven years from now, when I shake loose the surly bonds of prison, free at last, free at last . . ."

"It works!" Swami remarked.

Celia smiled with satisfaction and did some fine-tuning.

Tyler's voice became clearer. "Now is the time for all good men to come Watson! I need you!"

We typed a response, and the laser jittered invisibly, scrawling words on the window, or the finger of God writing on the wall, as Swami preferred to call it.

"My prayer has been answered," Tyler said.

"Now it's time to pray to the system," Swami quipped.

I found it ironic that I was going to fight the technology that had been working so hard to prevent or cure handicaps like mine. We owed Tyler and Celia, and I promised to pay them well, if any fruit

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fell from the trees.

The next time we met in the apartment, Swami was ready with a connection from the apartment to the office network. That link was wireless, but encrypted. The apartment was old enough to have landlines, but they were analog. Swami was going to rig a converter at the office before we went much further. Now we needed to steal an administrative password. There were all kinds of ways to attempt that, we learned, and most of them were detectable by security. There was a simple one that Tyler always tried first. Once set, I phoned Tyler and told him to go and say his prayers. In a few minutes, we were reading him.

"Get yourself to a login prompt," he said.

"Ready."

"Okay. Type the following credential." Tyler then recited a login ID that included some kind of prefix and a suffix. Only the middle part was like my own ID, which I never had to use unless my biomatch was on the fritz. He waited a little bit, then gave us a complicated password.

Swami's face lit up like a reefer. Or so I assumed. "I'm in!" he said, laughing. "I'm really in!"

"I'm confused," I said. "Why did we need the windows, scope, and computers, just for that?"

We hadn't. What Tyler had given us was simply a super user account and password that shipped with the company computer. No one had ever changed the default, a stupid oversight, but common.

"Getting in is just the start," Tyler said. "You're going to need my help breaking other barriers, mining data, and a lot more."

I couldn't really follow what Swami and Tyler were doing most of the time, and I gave up participating in the conversations. I was just a middleman between them in an already awkward process.

After a week and a half of working a little almost every day, they began to piece together a picture of what was going on. They began to ask questions about the company, about patent law, and other things. My job became to research these things. Sometimes the information was readily available, especially the more controversial items, since the debates filled public records. Details about the company were harder to come by, but with a few assumptions here and there, things became clearer.

Meanwhile something significant happened, and something else significant didn't. What didn't happen was anyone hearing from Tina again. What did was that my parasitic arms began to grow back. What had started as aching became swelling, and then skin breaking. I guess my chest cells weren't able to change into knuckle cells, so the fists had to punch their way through. I didn't go back to the hospital to have it checked out, for many reasons. Besides, the skin cracked and healed all along, so it never got messy. But it itched like hell.

Obviously my arms had some kind of regenerating tissue in them, something unheard of in humans. Like an amphibian growing a new tail, I grew new arms. It even occurred to me that my "baby arms" might have been cut off when I was a newborn, and when they grew back, my parents might have given up. The only reason I had to suspect that was my mother's overcompensation, always telling me that the arms were a gift of some kind.

I'd worked at the company long enough to know the value in self-regenerating bones, muscles, skin. It would be worth a fortune.

Several things led us to conclude that the "test signal" that Tina found, the one that looked like me, was not only deliberately injected into her queue, but it was also a viable target, an organism with unique stem cells, probably. It was impossible to trace who put the target in her queue or where the target originat-

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ed, but clearly Tina was set up to contact me about it.

Her e-mail told as much. The company was doing something bad to me, she'd said, and she had helped them. What had she done? She had convinced me to cut off my arms, that's what. Not only cut them off, but donate them to research. It seemed as though that was part of the plan—to get me to sign over my discarded tissue.

Without knowing why I was interested, my boss Dave linked me to some interesting reading. Companies like Good Fortune were crippled by patent law. They can't patent drugs or organisms that are common to living beings. Long back, labs tried to patent genes sampled from Third World tribes. Someone even tried to own the whole human genome. Vampires, people called them. Still, the demand was high for cures, longevity treatments, and other innovations. In this semisocialized industry, how could one make enough money for the expensive research?

That's where Genie came in. It was legal to patent nonhuman organisms that were extinct, since there were no living stakeholders. If you could regenerate a dinosaur's DNA, you could either own it and keep it proprietary, or patent it and make money off it. Another thing you could patent was a transgenic organism that was composed of more than one species, spliced together. Those two were what most of our targets turned out to be. The problem with transgenics was that it was illegal to "instantiate" them because of potential biological risks. Extinct species were also controlled, but less so. One school of thought said that because they had once lived, they were not mutually exclusive of modern life-forms, while another view was that they might well be. The uncertainty left loopholes in the law.

I was trying to figure out whether I was a solitary example of a species, in which case there were no applicable laws, or whether I somehow fit one of the categories typically handled by Genie. Time to consult a patent lawyer.

Her name was McKenzie, and her office in a high-rise had one of those views you see on TV. The office itself wasn't so glamorous. The furniture looked cheap, and you couldn't read anything on her SmartDesk because of the books and papers piled up on it. McKenzie was a handsome woman of about fifty, blond hair tied back tight, wearing a brown pantsuit. She made me nervous, and I sat in a worn leather chair, rubbing my chest and hoping my scabs wouldn't bleed.

McKenzie hit the nail on the head immediately when I told her what happened to my amputated arms. "When you sign away tissue samples," she said, "they become the property of the owner, so long as they are used in accordance with the terms of the agreement."

"Which means?"

"If your tissue does not occur normally in nature, and if it has the potential I think it does, it means that your company can patent it. They can develop treatments and cures with it and own the profits. You'd get nothing."

She went on to explain with excitement some precedent cases, both failed and successful. Moore. Slavin. York versus Jones. Glamorous names like that. Kilroy versus George Washington. University, that is. It all came to a head when they realized that all the data they needed to cure several nasty diseases was available for free. Decades of detailed military medical records held reliable data that could correlate all sorts of diseases with genetic history, eating habits, exposure to hazardous materials, and more. All one had to do was to mine the data in a meaningful way, and a medical revolution could pop out. Department of Defense doctors fought for patient privacy—and they are good fighters—until someone found a way to use the information anonymously.

It wasn't enough to simply strip the names. They had to build a completely

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different data set, using not only made-up names, but made-up places of birth, made-up medications, and made-up diseases. This sanitized data was sold, and places like my company used it all the time. When we found some correlation, we'd have to submit the finding to DoD, which would translate the result to the real world using a codec. We paid a fee, and they gave us exclusive rights to the finding.

But this business about someone patenting my tissue samples hit me from left field. I must have looked puzzled because she put down her pen, folded her hands, and sighed. "Let me try to be clear," she said. "If the laws were just a little different, you would be patentable yourself. This isn't exactly true, but let me say it this way for simplicity. A deformity can be patented because it's not a normal human condition. You are the only stakeholder, so you can patent your bad genes, or good stem cells, or whatever makes you unique. What seems to have happened here is that your company's computer came up with a—what did you call it?"

"Target."

"A target like you. Only someone realized that you already existed."

"I'm pretty hard to miss."

She nodded politely. "Or they knew your arms would regenerate, so they created your test signal as a trap. Either way, they contrived a situation to get you to cut off your extra arms and sign them over to them."

"They did a damn good job of it too."

"Your Genie system alone wouldn't let them patent anything. To be patentable, an invention has to be proven to be useful. They have another system that does that."

"The Simulator. A system that creates a virtual organism, and monkeys around to see if it cures cancer or whatever."

"They've covered all the bases." She smiled. "Now, about that agreement, when you signed over your discarded tissue. What were the terms?"

"I didn't read it."

"Do you have a copy?"

"No."

"I'll dig it up," she said. "It will be on file. All you have to do is sign a release so I can get it."

I rubbed my chest where two new sets of knuckles were kneading their way through from the inside. "If I signed away all my rights, doesn't that mean that I don't have a case against the company?"

"Not necessarily," McKenzie said. "Can you prove that you signed the papers at a time when you didn't have the benefit of your full intellectual faculties?"

"Maybe," I said, thinking. My mind had been in a haze that day. "Yes, I think I can."

"How so?"

"First of all, I was being prepped for surgery. They had an IV in me."

"God only knows what was in that," she said. Of course, there were probably medical records that someone other than God had access to, but she sounded like she was rehearsing her case. I liked her.

"Then there was Tina. She was the one who talked me into signing. She practically held the pen for me."

"Fraud and coercion," she said. "Anything else?"

"I think Tina will testify on my behalf," I said.

She smiled briefly, then grew serious. "You have a very strong case, Mr. Tanner. You stand to make many millions when all is said and done."

"How many millions?"

"Let me work that up. The more I think about it, the higher I think we can go. Hundreds of millions, without a doubt."

My head swam and my chest ached. "You're kidding."

She put down her pen and closed her notebook. "This company is going down."

"That's great," I said, not so sure.

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McKenzie assembled a legal team covering the necessary disciplines. I received a call from her the next week. No one at the hospital could back my story, she said, so my case hinged on having Tina testify. McKenzie sent a private eye my way, a guy named Lund. He was tiny but stout, with muscles. He had a shriveled scalp with short, sparse hair that stuck up in different directions, like the way my dad's generation used to spike their hair. I took him to visit Tyler in the pen.

"Lund thinks that Tina has probably gone to find her estranged mother," I said.

Lund focused his eyebrows at something invisible, then brightened and looked at Tyler through the window. "We thought you might be able to help track down your ex-wife."

Tyler's mouth turned down, and he looked like he was going to spit. "It's been twenty-three years."

"A few good guesses are all I need to get started."

"Like what?"

"Favorite places, alternate names, family ties, old dreams. How long were you married?"

"We weren't. Lived together for seven years."

Tyler proceeded to throw out some random ideas. Tina's mom liked Broadway, disliked cold, and had enjoyed Atlantic City. Therefore, Las Vegas? Other possibilities for other reasons were Baton Rouge and SoCal. Lund was good to go, but I had something else to discuss with Tyler.

"Any luck with Swami's magic weeds?"

"Not specifically, but we're making progress."

"That's better than we're doing finding Tina."

"Not to worry," Lund said.

"And how are you doing with Genie?"

"I'm all over her," Tyler said. We pretended Genie was a person, so the wardens wouldn't suspect Tyler was wired into anything. "If you can't sue the panties off of the company, I can at least stuff Genie into a bottle."

"You sound like you've done this before."

Tyler hummed Beethoven's "dit-dit-dit-dah," musically pleading the Fifth. I looked over at Lund, who was making no pretense at respecting our privacy.

"Okay, Lund," I said, "Let's get out of here so you can find Tina."

The next day Lund called to say that he had all the inside information about Tina's car that was in any system. The vehicle did not have a transponder, and there was only one data point logged. Tina had passed through a tollbooth entering Delaware a couple of days after my operation. Not much help. Lund said it didn't mean she was still in Delaware. She could be anywhere.

He had also tried to check her bank records but was unable to buy or steal anything useful. "Your friend has really covered her tracks," he told me.

"That isn't like her," I said. "Is it possible that she just hasn't made many tracks?"

"Yeah," he said, miffed. "Very possible."

I went by Tina's office, not expecting to find her, but I was just drawn there. No sign of her. Bored and lonely, I stopped by to see Swami.

"How's the search for your herb coming?" I asked.

"The proceeding is so painful, and so slow, slow, slow," he said, apparently quoting something. He brightened and wheeled his chair full around. "But we'll find it. Tyler helped me get into the targeting algorithm. I can also bypass the simulator's kill function. That's a lot of help, but it creates a hell of a lot more targets to look at."

"How long do you think it will take?"

"Me no know. Could be years."

"Whoa." It occurred to me that Swami had conflicting goals. He needed Tyler to help him with his project, but that

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meant involving me—and I was in the process of jacking the company. "Let me ask you something, Swami. You said something once about us being organisms, not an organization, right?"

He smiled, pleased that I'd remembered. "Yeah, right."

"Why would someone like you work in a place like this?"

"Because there's no revolution that can turn this country around. Fighting the system is a waste of time. The only way to change anything is from the inside, using the same ways that got us here to get us to somewhere else."

"Fight fire with fire, eh?"

"Well, yeah, you could say it's the means to an end. The company's not the enemy, you know. I share a common goal with it: healing the sick. It's disappointing that I'm sincere about it, while the company has an ulterior profit motive. But if you've got a better way, I'd like to know about it."

The lawyer called, and I went over to meet with her. It sounded like there was some big news already, and we couldn't talk freely on the company phone. McKenzie leaned forward in her chair. Though she still sat higher than me, and her dress was as tidy as ever, her informal posture made me feel more like a partner than a customer. She had two piles of paper on her L-shaped SmartDesk, which also had a lot of virtual stuff strewn around.

"Have you ever heard of biocolonialism?" she said with a gloating air.

"No."

"The government owns patents on people's genetic material."

"I think you spoke of that once before."

"Yes, but this time there's a lot more to it. They started with minority races in shrinking populations such as island cultures, ostensibly to preserve vanishing peoples. But it got ugly."

She went on to tell me that I was part of a class-action lawsuit they were developing. It went beyond my case, and would take a lot longer, but it would bring justice to a lot more people. I didn't like the sound of all that. I'd thought we had a clear case, I'd easily win, and life would go on. I could be generous to those who'd helped me and make a better life for myself. But the more she talked, the more it sounded like harder work than what I was used to and it would involve more people. I was all for justice, but slowing it down wasn't my idea of progress.

The lawsuit had become grander than just someone tricking me out of a patent. First, she had done some research, and there were a lot of potential cures possible from my tissue, not just regrown limbs. My nervous system was different from normal people's, and it was possible that cures to spinal and brain injuries and disorders could be derived. If I happened to suffer one myself, I'd have to pay to license the patent.

"Don't you see what that means?" she said.

"Yeah. I could get ripped off again."

"Think broader than that. This is a very exciting area for us. In the business, we call it hyperownership."

"Whatever."

She smiled knowingly. "I know it sounds technical, but during testimonies, we'll call it by its real name. It doesn't matter if you own all of someone's body or just a part—if you use it for gain without permission and compensation to the rightful owner, it's slavery, pure and simple!"

That made me laugh uncontrollably, until it made my breastbone burn. Then I coughed and coughed, my chest wracking from deep inside, all the way out to my cursed bony knuckles.

McKenzie had laughed along, then winced, but didn't know what to do. "Are you all right?"

"Yeah," I said, gasping. "Ouch. You're serious?"

"Totally serious. We will prove that your company, through manipulation,

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fraud, and duress, tried to enslave you for profit. We'll also get them for malpractice, coercion of unwanted radical surgery, deliberate dismemberment in particular. So you'll get a bundle for that too. And there's more."

"What's this class-action business?"

"You aren't the only victim of this sort of thing. We are gathering evidence that there are others in similar situations. I have a partner who would also like to speak with you about your mother's medical background. There may be a possible settlement there too. A big one."

Everything had become big, and I went back to work with a big headache.

I went right to Swami and told him most of what was going on with the lawyers. I thought that the promise of explosive justice would be music to him, but he dismissed it.

"That just means that the law firms would own you, instead of this company. They'd be controlling the case completely. Your job would be to make them a lot of money, wouldn't it?"

I couldn't deny that.

"You either own yourself outright or you don't," he said.

"For a hundred million bucks, what do I care? The lawyers can own me."

Lund scored. He found Tina's mom and made contact with her. She was married and living on a lake in Tennessee. She said she had not seen her daughter in over twenty years, and Lund believed her. He put a call in to a private eye in that area to make sure.

Lund suggested I e-mail Tina again. She might be monitoring messages, and though she had ignored me before, if I sent just the right message, he said, she might be compelled to reply. I sent a secure message from one of those untraceable, single-use accounts. I indicated that we were ready to sue for hundreds of millions, and that we needed her here. Against my better judgment, I lied that her father was gravely ill. Lund was the expert.

To my surprise, I received a reply within minutes.

JIMMY ~ YOU ARE SUCH A BAD LIAR. ATTACHED IS MY HORROR NOVEL, THE ONE I TOLD YOU ABOUT. I WOULD NEVER HAVE FINISHED IT WITHOUT HIDING OUT. I NEED YOU TO TRY TO SELL IT FOR ME, SO PLEASE PROMISE YOU WON'T GIVE UP UNTIL IT'S PUBLISHED. DON'T LET THE BASTURDS TELL YOU IT'S NO GOOD, BECAUSE IT IS. ALSO, YOU SHOULD GO AHEAD AND SUE THE COMPANY WITHOUT ME. TTFE ~ T

The attachment was a book called *Malignance Aeterna* by Christine Peshj. I couldn't focus on it long enough to make sense of it. Maybe it explained what "TTFE" stood for. The message had me really scared. I couldn't stand it, so I left work early and went by her place. With her book done, maybe she'd returned from wherever she'd been hiding.

Her car was out front. I shuddered and my heart rammed at the inside of my chest. My little forming hands twitched in reflex. The door was locked, and Tina wasn't answering. I threw myself against the door until my hip practically broke, but it was made of metal, and I remembered the bolt and chain. So I broke a window around back, not caring that it was daylight. I climbed in, called out, and ran around like an idiot, not knowing where to start.

The apartment was dark and musty. There were lights on, and the table in the breakfast nook was covered with junk mail. A few dishes sat in the sink, stained with spaghetti remnants, and there was a metallic purple handbag on a chair in the living room. I walked quietly into the living room, afraid to call out for some reason. Some of the lights were glowing on her theater set, but there was no picture or sound.

"Tina?" I said, almost under my breath. More lights on in the bedroom, shining through a wide crack in the doorway. "Tina?" I had never been in her bed-

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room, and going in, I felt like I was violating something sacred.

Then I heard a drip. Tina was in the bathroom, but all I saw was red. The sound of a thousand urgent voices rushed into my ears. It sounded like angry water, and I felt myself going over Niagara Falls.

I woke up cold and shivering, my head light, sweat running from my forehead into my hair. The voices had faded to echoes. I tried to sit up, but nearly fainted again. I stayed down, in the bathroom doorway, afraid to look in.

I spent the night there on the floor. In the morning, I called the police and crept out of the place, without looking in the bathtub again. The police arrived before I got away, and when they started questioning me, I felt strangely hungry and fainted again.

Swami came by my office to offer his condolences. His electric wheelchair was pretty compact, but it didn't fit through my cube door. So he sat there, saying something expected, but not helpful. I felt trapped because he blocked the door. I could tell he wanted to talk about something but was uncomfortable bringing it up. He looked down, rolled his chair back and forth a few inches, then sighed through his nose.

"Look, Jimmy," he said, checking to see if the hall was clear. "How is it going with your target? You know the one I mean."

I nodded and made eyes at the wall separating us from Kaitlin's cubicle. He nodded.

"I'll come by," I said.

Later, after verifying the privacy of his office, I told him how the lawyers were now saying that I could still win my case easily, even without Tina to testify. Simply signing those papers in my condition, combined with the resulting legal situation, created a clear case of hyper-ownership by fraud. They were calling it slavery.

"So you're going to sue?"

"The only delay now is for the lawyers to determine whether Tina's parents have any grounds to sue also."

Swami made a grim line with his mouth and nodded. "I guess I'd better start looking for another job, then."

He was playing me, but I was too tired to fight him. "You really think the company will implode?"

"Sure. That's the idea, isn't it?"

"So what do you want me to do?" I said, raising my voice. "I've got these stupid arms growing back, everything will be just as bad as before, except that Tina is dead—not that anyone cares—and you want me to stand by while the company gets rich because of all that?"

He just sat there looking stupid in front of all those posters of trees.

"Either they own me or I own them," I said. "You said as much yourself. And look what they did to Tina. Damn right I'm going to sue."

When you're out for blood, you don't usually aim for the wound that bleeds the most. You take any and all of them.

"After I get my settlement," I told Tyler through the glass, "I'm going to put Good Fortune out of business."

"No more cures discovered by accident?" he cautioned.

"No more stolen tissues or patenting people's misfortune," I said.

"What about Swami's tree?"

I exhaled impatiently through my nose. I didn't have an answer for that. Revenge on the company was revenge not on an organization, but on the people who worked there, and I really didn't think Swami's trees were complete crap. I'd found a few good targets myself, and that had felt good.

"Tyler," I said, heating up again. "These guys are to blame for what happened to your daughter. What would you suggest?"

"It's too good an opportunity to pass up."

I had an irrational hope that with my

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extra arms gone, Kaitlin might finally go out with me. Besides, there was something important I wanted to ask her.

"No, thank you," she said, pursing her lips in what was intended to be a polite smile but had nothing friendly about it.

"It's just lunch," I said.

"Jimmy, I told you a long time ago that I'm not interested. How can I make that clear to you?"

"News flash. I'm not asking you to lunch because I'm interested in you. We can go Dutch if you want." Her expression fell into confusion. She probably didn't know whether to be happy or feel insulted. "There's something I want to run by you, and I can't do it here at work."

"Is it about Tina?"

Good guess. Not right, but close enough, if that would get her to say yes. I nodded.

Her eyes scanned me like some kind of lie detector. "Okay," she said.

I decided to take her to a nearby diner, so she wouldn't think I had ideas of hauling her off somewhere. Our coworkers often went there, which should have made her feel safe. It made her nervous. I guess she didn't want to be seen out with me. I was nervous, too, keeping my jacket on so she wouldn't see the little bulges where my arms were growing back. Hey, I didn't have ulterior motives, but I wasn't against some ulterior outcome. The waitress came, smiled, and looked me over.

"We're having a working lunch," Kaitlin said hastily.

I smiled in confirmation and we ordered. The waitress left, and Kaitlin got right to business.

"So what's so important?" she said.

"Actually, I want your advice."

She just looked at me, waiting for me to speak, as if she wasn't even going to offer pleasant conversation.

I'd shown interest in Kaitlin for a long time and asked her out several times before. She could be chatty with me, but never on a personal level. Mostly it was always about some crazy target someone came up with or other work stuff. I remember once when I'd fooled myself into thinking that she did like me, only to realize that she only wanted some images of a target I'd found, in order to make a funny greeting card out of them. Something about a shriveled Easter rabbit with no fur. Now I was finally having a kind of date with her, and I felt like a bag of ice.

"Do you think it's right," I said, "for someone to sue the company they work for?"

"I don't know. What are you talking about?"

"I can't say exactly, but suppose the company makes a ton of money by exploiting an employee? Several employees."

"Of course they should sue."

"That's what I thought too. But my friend, who works at this dump, is afraid he'll put it out of business."

"So what?"

That was too easy.

"You don't look happy," she said. "Isn't that what you wanted to hear?"

"Maybe not. I guess I've slanted the story, and I really wanted an honest answer."

She frowned at me, and her voice became low and deliberate. "How do you honestly expect me to give you an honest answer when I don't know *what* you're talking about?"

"You're right." I made a conciliatory study of my lap. "It's just that I can't tell you about the whole thing."

"This is about our company, isn't it? They did something to Tina, and her family is trying to sue, aren't they?" Her eyes widened with shock, and she inhaled loudly. "Are you saying she didn't kill herself?"

"She did. I was the one who found her."

"Oh." Kaitlin looked at me with a pained expression. "I'm sorry," she said. "That must have been awful."

"It was."

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"Well, if Good Fortune is somehow responsible for her death, then a lawsuit over that just might put it out of business."

"I know."

"It wouldn't really solve anything, though. And what about our jobs? Do you have any idea how hard it is to get work these days?" She was tearing up, waiting for my answer. I'm not the most sensitive guy, but seeing her like that tore at me. "Well, do you?"

"I guess not. To be honest, I've never had any trouble getting a job."

"Oh," she said, understanding. She may not have known that my handicap was caused by my mother using salamander neurotrophic stem cells to treat nerve damage in her spine, but everyone knew about the placement programs that gave people like me almost a guarantee of a job. "But it's just so *dark* to sue the life out of a company, get rich, and leave everyone else totally unemployed."

The food came, and Kaitlin chewed almost angrily. I didn't think she was mad at me, because she didn't know I was the one suing. Still, I didn't want to let her stew like that because of me.

"Have you seen the new *Wizard of Oz* refake?" I said, trying to brighten the meal. "They aged Judy Garland down by eight years and gave the good witch some cleavage to compensate."

"The women in that movie are all complete idiots," she said.

Ouch. You try for small talk and you hit a nerve. Anyway, I guess I got what I was looking for. I didn't like it.

The next day, I got a courtesy call from McKenzie. No news, just checking in. She was professional that way, but it made me nervous. My life was just another business transaction to her. She sensed a problem and asked. I hemmed and hawed, but didn't really say anything.

"It's normal to have cold feet with this sort of thing," she said. "I have a great idea. Can you join me for lunch?" Man, was she slick.

"You paying?"

"My pleasure. I'll pick you up at work. There's someone I want you to meet."

McKenzie must have really wanted to make a point, because we went to an expensive restaurant. I rode in front. In the back was a frumpy lady in her thirties named Maysie. After a quick introduction, she became sullen and didn't speak a word. When we got to the restaurant, a man in a tux opened our car doors, while a valet took the car. Maysie was very slow and out of it, like she was only following us because she was stuck in our wake.

We sat at a round table in the middle of the fancy dining room. The windows were darkened and glazed with gold lights that seemed to run downward like streaks of rain. The other walls had dark gold drapes covering them, and from the ceiling hung huge globe lights that were very dim, despite their size. McKenzie and I made small talk, and we all ordered. I had no idea what some of the food was, so I just ordered a T-bone.

"I wanted you to meet Maysie," McKenzie said, "because she is one of the plaintiffs in our class action suit. Is it all right if I describe your case to Jimmy?" Maysie nodded, so McKenzie continued. "Maysie recently lost a baby during childbirth. Like you, she signed some papers at an inopportune moment, without being given a clear and full understanding what they meant. I don't need to paint the picture for you."

"No," I said. "When you go to have a baby and have problems, I don't expect you're in the mood for fine print."

McKenzie made a saccharine smile. "Very perceptive of you. Unfortunately, the papers she allegedly signed gave Good Fortune's parent company full rights to what they called 'discarded tissue.'"

"It was my son." That was the most Maysie had said up to then. "I held him in my arms. I knew he wasn't going to

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make it, but I gave him a name. . . ." Her jaw dropped and quivered, a string of saliva hanging between her lips. A tear shot out from each eye when she blinked, and she couldn't continue. I just looked at where one of the tears made a spot on the table linen.

"They made a major breakthrough concerning the disease that killed her son," McKenzie said, "and they did it with that little boy's body that she was coerced to sign away. The cure will be worth hundreds of millions."

Maysie collected herself. "I'm truly glad that this disease may be cured," she said. "But sometimes I just wish I could have buried him." She struggled for words. "It's like he's still out there somewhere, being exploited by strangers."

"So you see, Jimmy? It's not just about the money, and it's not just about ownership. It's about fundamental human rights. Maysie's case is not atypical. But your case is different, because you're still alive. You can make a strong testimony. We need you to fight for your rights on behalf of a lot of people just like Maysie."

She locked me with a concerned stare, like a teacher glaring when you don't have your homework to hand in. When the platters of food came, I was in no mood for steak.

I had the dream of my extra hands strangling me again. My parents were dead, but still conjoined to my body, like the previous dream. As the hands choked me, the last fragments of my parents finally fell off. Then Tina came, like a ghost, and the hands fell motionless.

"Are you going to take my parents' place?" I said to her.

She didn't answer, but pointed to my little arms. "I know how to make them stop strangling you."

"I already tried cutting them off. That didn't work."

She just laughed and started to glide away, the way ghosts do. "TTFE," she said over her shoulder. "Ta-Ta For Ever!"

I woke up sweating and feverish, maybe from cutting new knuckles. I flexed the tiny fingers, which were not hard bones yet and were still partly submerged under scabs that itched like mad. I contemplated what Tina might have meant about knowing how to make them stop strangling me. I didn't like her way of ending problems.

They were planning a memorial service for Tina in the prison chapel, so Tyler could be there. Even Tina's mother was coming. I didn't want to think about all that, so I kept myself busy continuing to hack into Good Fortune's systems. I didn't care why anymore, but I wanted to know exactly *who* sent that target to Tina. I went to Swami's office for help, but somehow he ended up lecturing me on the rapid evolution of the *sativa* species of pot, caused by something called polymorphism.

"The prophet Ezekiel and some priests used a matriarchal strain called *pannag*, but mostly the herb was reserved for use anointing the Ark of the Covenant," he informed me. "If we could only reverse-engineer the DNA that far back, that would be good enough."

"You're twice the med school dropout I ever was," I said.

"I didn't go to med school."

"I know, I know. Listen, I need you to look into something. See if you can get some access certs for something on the administrative side of the house, instead of the technical. You know, where the money is."

"I don't think I want to do that," Swami said. His eyes betrayed his intrigue.

"Listen, Tyler's good. No one will ever know what happened."

"It's not that. Look, Jimmy, if you take down the company, you are ruining the chances of finding some important discoveries."

"What, like your holy ark polish?"

His brow furrowed, and he leaned on his chair's control arm. The chair lurched around and crawled across his

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office toward me.

"You think I do all this for myself?" he said. "What I do is for the healing of the nations. That means everybody, including people like you. People with extra limbs, or malformed limbs, or no limbs at all. People born with their intestines hanging outside their bodies, kept alive by some heartless science that thinks it's doing a good thing."

He might have gone on, but my feigned gagging motions took him aback. "Spare me," I said. "I told Tyler to wait until you had a fair chance to find your blessed tree. Or at least Mary Jane's grandmother. Are you going to help me or not?"

"Not." He rolled back.

"Look," I said, "I need you, man. It doesn't have to be all or nothing." I was thinking about Kaitlin, something she had said, and something Swami had said about organisms. "Maybe we can mess around a bit without jacking the whole place."

"You're not making sense, Jimmy. Exactly what do you have in mind?"

Some dormant thought awoke in my mind, something about the company's administrative systems. "I know exactly what to look for!" I blurted. "Can we get into the virtual board of directors?"

Swami gazed at one of his trees for a long time, then turned to me again. "That's a tough nut to crack. I have no idea—" Instead of finishing his sentence, he turned to his SmartDesk, and began to surf.

Though Tyler had been out of his daughter's life for many years, their recent reunion and then her sudden death had been a shock to him. He insisted on a service in the prison, where he could have a little more time with her. The Freedom of Religion Act meant that they almost had to allow the funeral in the prison chapel.

I'd been in church before, dressed up, for my grandmother's funeral. The church felt like a prison to me then. I think I was about nine. Strangely, this church, which literally *was* a prison, felt completely free, as if being there was like being in a heaven imagined by that nine-year-old boy.

It was also strange to be on the same side of the Plexiglas as Tyler. It was strange imagining Tina's ashes in the colorful urn before us. The urn was cloisonné, with lots of little geometric shapes that looked like the stained glass window above the simple altar. It was strange to stare up at that window and imagine Tyler hacking our computer from there.

A few of Tyler's inmate friends came, patted Tyler's shoulder, and then sat down, leaving him alone. I was the only outsider in the chapel until Tina's mother showed up.

"Look there," Tyler said. "The devil in a deep blue dress."

She was a worn but attractive woman with heavily teased blond hair and a beauty scar on her lip. She cried when she saw the urn. Then she loudly informed Tyler that he was in prison. Other than that snide remark and his raspberry reply, they did not speak to each other. I sat on the front bench, next to Tyler. I didn't want to look at anyone because if I saw someone cry, I might choke up too, so I fixated on the urn.

"Why did Tina do it?" I found myself asking while we waited for the preacher to arrive.

"I think she was looking for love, but couldn't find it," he said. "There's an old Beatles song where the singer refuses to live in a world without love."

"I don't know. That's pretty old-fashioned. Love, I mean. I happen to know that Tina thought so. She thought love was impractical, unenlightened, unattainable, and all that jack. It's a sign of weakness, to need someone, isn't it?"

"Ah, I see. She told you all that?"

"Yeah."

Tyler had a twinkle in his eye. "She must have loved you quite a bit then."

"Very funny."

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"I've heard that some Asians don't like to show affection because it places a burden on the one you love, making them feel indentured. Some people have to love like that, in secret."

"That's jacked," I said. "If love has to take a back seat to all that, what good is it?"

Tyler didn't answer, but he squinted slightly, looking pained.

"No, man," I said. "Love is dead."

It was true, but it was the wrong choice of words. I pursed my lips in apology, just as the preacher came in from the back.

We had to be quiet when the service started. I pretty much ignored the sermon because I was afraid I might actually cry. So I fixated on the windows that made a colorful pattern that reached to the top of an A-shaped frame that pretended to be a vaulted ceiling. No one there but Tyler and I knew what the windows really were. And only I knew that Swami was tuned in at the receiving end of a prayer.

"Send and pray," they called it, when you sent a message, not knowing whether it was received. The phrase fit my little scheme, only in this case it was more of a "pray and send," like putting a five-dollar nickel in a slot machine and hoping you hit the flapjack.

The service ended and everyone left, just like that. No one really cared. Tyler and I lingered, and then he was ready to go too, but I stopped him.

"Do me a favor," I said.

"What's that?"

"Pray to the system." He looked confused, so I said, "The great Swami in the sky is listening."

"Oh ho!"

The two of us knelt at the altar, acting as serious as could be, me with my hands folded and my head "upfull," as Swami called it. Tyler started chanting passwords, glancing up at the stained glass window with each one. Three of the colored panes were pulsing with oily patterns, but the one at the apex remained sky blue. After several attempts, pale letters appeared on the blue window: CREDENTIALS AUTHENTICATED.

"All set," said Tyler.

"I've got a little prayer of my own," I said, pulling out a paper note from my pocket.

My boss, Dave, had once sent out copies of a book called *The Pharaoh's Headstand*, which was all about employee empowerment. The idea was to turn the corporate pyramid upside-down, hence the "pharaoh's headstand." Obviously, the book was propaganda to make us think the company cared, when all they really did for us was to buy the lousy book. "Employees are the most important stakeholders," and crap like that. Well, if that's the way they wanted it, I was more than willing to put them on their heads.

My notes were a carefully worded set of parameters to the board of directors program. I prayed for a new profit paradigm. I prayed for a new definition of human capital, one that would make us assets that more than paid for ourselves. I prayed to reverse hyperownership and to reassess the priorities of Good Fortune. It was my own test signal, injected into the most vital organ of the company. Maybe the results would project more profit in the long run. Who knows?

Tyler was gazing up at the window. "Look," he said. "The writing on the wall."

It was the return display, and as I watched, words appeared: INPUT ACCEPTED.

Tyler looked at me like a proud father. "Still sure love is dead?" he said.

I shrugged. Well, I sure as hell wasn't *feeling* any love. I was just thinking that it would be good if Kaitlin could keep her job, if Swami could find his holy grail, and if I didn't take *all* the company's money.

It would also be good to discover something really important by accident. I was getting the hang of that. ■

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Science Fact

Strange Croaks and Ghastly Aspirations

Henry Honken

The Khoesan family, also know as the Click family, contains some thirty or so languages spoken by small populations in Botswana, Namibia, and adjacent regions. Formerly, these languages, famous for their distinctive click sounds, may have occupied much of Southern Africa.

To the first Europeans to make contact with Click languages, the clicks were startling enough. The name Hottentot[1], originally applied to herding Khoesan like the Cape Khoekhoe, is Afrikaans for "click and clack." But the unusual vowel colorings of some Khoesan languages also impressed the settlers who complained of "strange croaks and ghastly aspirations."

Khoesan speakers are aware that their languages are distinctive. The South African linguist Dorothea Bleek wrote that one of her /Xam informants said that "Europeans speak with the front of their mouths and Bushmen speak with the backs of their mouths." The Khoesan language Ju/'hoan contrasts *kokxui* "to speak" with *maqni* "to speak a non-click language" and other Khoesan speakers make a similar distinction.

While European languages like English don't use the click sound category, the symmetries exhibited by consonants are actually fairly similar in both groups. The roughly six thousand languages now spoken or signed by human beings make use of about two hundred sounds. Of that number at most a score are universal, in the sense that they are found in nearly all languages and are the most common sounds in those languages.

The number of sounds used in any given language varies enormously, from a minimum of eleven in Rotokas (spoken in Bougainville, an island off Papua New Guinea) and Pirahã (spoken in South America) to one hundred sixty-

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Stops	p	t		tš	k
	b	d		dž	g
Fricatives	f	ɸ	s	š	
	v	þ	z	ž	
Nasals	m	n			ŋ
Continuants		r	l		
Approximants	w			j	
	h^w				h

Table 1 Consonant system of English

three in the Khoesan language !Xoõ. Most languages have thirty to forty sounds and English, the language of this article, falls in that range with thirty-six distinct sounds[2].

One striking property of human sound systems is symmetry: the sounds of a language can normally be divided into groups based on shared properties. I will illustrate this with examples from English. The distinction between vowels (resonant sounds with minimal turbulent airflow) and consonants (sounds with some degree of constriction) is universal. There are twelve vowels and twenty-five consonants in English (my version, see note 2). Table 1 will give some idea of the internal structure of the consonant part of this system.

In Table 1, *p*, *t*, *k* represent the initial sounds of *pat*, *tap*, *cat*. The symbol *tš* represents the *ch-* in *chat*. Similarly, *b*, *d*, *dž*, *g* are the initial sounds of *bat*, *dot*, *jot* and *got*. The sounds *p*, *t*, *k* and their voiced equivalents are technically known as stops because they are formed by completely stopping the flow of air from the lungs out of the mouth for a short interval.

English also has fricatives—sounds formed by allowing air to escape through a constriction. The symbols *f*, *ɸ*, *s*, *š* represent the initial sounds of *fink*, *think*, *sink* and *shrink*. The *v*, *þ*, *z*, *ž* of *vine*, *thine*, *zeal* and *genre*[3] are their voiced counterparts.

Finally, English has the nasals *m*, *n*, *ŋ* in *same*, *sane*, *sang*, the continuants *r*, *l* in *right*, *light* and the approximants *w*, *j*, h^w, *h* in *wet*, *yet*, *what* and *hat*. In producing nasals, the air, stopped from exiting through the mouth, escapes continuously through the nose, causing nasals to sometimes pattern with the oral stops and sometimes with the continuants. Continuants are consonants which are normally voiced and can be prolonged like vowels. Approximants "approximate" two articulators (the active articulators are the movable parts of the mouth, the lips, tongue and glottis) but not closely enough to produce much friction.

The information in Table 1 has been introduced here for two purposes: first, to give an example of how sound systems are structured. The data in the second part of this article will show that the sound systems of the Click languages are like that of English in many ways. For example, there is a clear division between vowels and consonants, and the consonants, both click and non-click, can be divided into stops, fricatives and nasals.

The second purpose is to illustrate the way in which sound systems are both symmetrical and asymmetrical. In the upper rows of the table, each column has the same point of articulation—for example *p*, *b* are both labial (made with the lips)—but the sounds in row 1 are voiceless, those in row 2 voiced (made with the vocal cords vibrating). Like-

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wise, rows 3 and 4 have a voicing contrast.

But there is an asymmetry between the two stop rows and the two fricative rows. English has two fricatives, interdental *ϕ* and sibilant *s* in the T-column, but lacks a fricative in the K-column. As it happens, English used to have a fricative here, a throat scrape like the *ch* in German *lachen* "to laugh." The *gh* in *night* is a fossil of this sound which has been lost in modern English (compare the German *nacht* "night").

Table 1 doesn't include all the sounds used by speakers of English, only those sounds used in normal speech. Interjections like *wow*, *uh-huh*, and *ugh* sometimes have unique sound structures. For example, to hush someone we may say *shhh!*, a prolonged *ʔ* sound not followed by a vowel, although normal English syllables always contain a vowel. And the interjection of agreement, *uh-huh*, contains a nasalized vowel like the vowels in French *Jean, vin,* or *brun*, even though in normal vocabulary English doesn't have a contrast between oral and nasal vowels.

Among such unique sounds in English are two which are technically called clicks. The first is usually spelled *tsk-tsk* and used to express mock pity or sometimes annoyance. It is produced by placing the front part of the tongue behind the upper front teeth and palate in such a way as to enclose a body of air, moving the center of the tongue downward to rarefy the air in the cavity, producing a sucking sound when the closure is released and air rushes into the pocket. The second, traditionally used to urge horses to move, is made by pulling the right side of the tongue away from the upper side teeth with a sharp sucking sound and has no accepted spelling in English.

Human beings can make many sounds that are never used in speech. So far as is known, no human language uses slaps on the cheek or finger snaps as speech sounds. In the majority of human languages, clicks, if used at all, are minor sounds as they are in English. But a few languages, almost all spoken in South and East Africa, employ clicks as standard speech sounds. Indeed, in some of these languages clicks are the most common type of consonant.

In spite of sharing this unusual phonetic feature, the languages that use clicks as speech sounds are not all related. Roughly speaking they fall into three groups. The first of these groups is traditionally referred to as Khoesan[4], and comprises what are usually regarded as the indigenous languages of South Africa, those languages spoken there before the incursions of Europeans and Bantu-speaking populations. According to current views among Khoesanists, the thirty-odd surviving Khoesan languages fall into three unrelated families: Northern or Ju, Central or Khoe, Southern or Tuu, and several isolates[5]: ǂHoan, Kwadi, and two languages spoken in Tanzania, Sandawe and Hadza.

The second group consists of those Southern Bantu[6] languages which appear to have borrowed clicks from Khoesan. The third is Dahalo, a Cushitic[7] language spoken in Tanzania, which again is presumed to have borrowed the clicks.

The only language outside Africa known to use clicks as regular speech sounds is Damin, a ceremonial language formerly spoken in Australia, which is phonologically so unusual in other respects that some linguists think it was an invented language. The Lardil themselves say Damin was invented by the legendary figure Kalthad.

Bantu languages are spoken over a wide area including South Africa. Speakers of Bantu languages are thought to have begun to enter the Cape and displace the indigenous populations about 2,000 years ago, resulting in a long and intense history of intercultural contacts. Since only those Bantu languages spoken in South Africa have clicks and

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many of the Bantu click-words can be related to Khoesan words, scholars are certain the Bantu clicks result from borrowing rather than independent development. Especially strong evidence for this is provided by closely related Southern Bantu languages like Northern and Southern Sotho, only one of which has click words.

Only some of the South African Bantu languages use clicks, among them Xhosa, Zulu, Southern Sotho, and Yeyi. Xhosa is notable as the native language of South Africans Nelson Mandela and the singer Miriam Makeba and its name begins with a click (the lateral or English "horse-cluck" click). Borrowed sounds though they are, clicks are quite prominent in these languages. One estimate is that in Xhosa and Zulu, some 15% of the vocabulary consists of click words.

The Cushitic languages are spoken in North and East Africa from Sudan to Tanzania. Dahalo, a dying language spoken by less than 500 individuals in Tanzania, is the only Cushitic language to have clicks. Again, since clicks can't be reconstructed for the ancestor of Cushitic, they are taken to be borrowed in Dahalo, although so far, none of the forty or so click words in Dahalo can be clearly related to Sandawe or Hadza, the two other click languages spoken in Tanzania. It is also possible the Dahalo replaced their original language with a Cushitic language retaining a few of their ancestral words.

Damin is a curiosity. Until recently, it was used by initiated men of the Lardil tribe in Australia as a secret language. The grammar is identical with that of Lardil, though simplified, and the vocabulary is very small with one word having many meanings. Damin has a number of sounds unusual not only among Australian languages but unusual worldwide, including a voiceless *l* (like the Welsh *ll*) pronounced with breath sucked in, an ejective *p* formed by pressure between the tongue and the closed lips, and four nasal clicks in different positions.

The click languages par excellence are the Khoesan languages, at present spoken mostly in Botswana, Namibia, and Angola. Only around thirty Khoesan languages are still extant, many others having vanished as the Khoesan populations were pinched between the Bantu filtering down from the north and Europeans pushing up from the south. Still others may simply not have been noticed. A few years ago, a Tuu language called N/u which had been thought to be extinct turned out to have a dozen surviving speakers and a number of partial speakers[8].

What is a click? Linguists call any blocking of the air stream a constriction, any complete blocking of the air stream a closure. For example, the sounds represented by *p* and *b* are produced by a closure of the two lips, while *f* is produced by a constriction of the lower teeth against the upper lip. All clicks have two closures: one in the back of the mouth, the area where *k* and *g* are made, or even further back, and one more forward, the suction sound of the click proper. In producing the click, the air trapped between the two closures is rarefied as the tongue changes its shape, and when the forward closure is released, air rushing into the enclosed space produces the sharp sound we perceive as a click.

When describing clicks, linguists refer to the more forward closure as the *click type* and to the back closure as the *click accompaniment*. Clicks are classified according to the position of the forward closure and whether or not there is friction. Traditionally, there are five clicks, though at least three more have been identified in Northern Khoesan languages[9]. From the front of the mouth back, the traditional click types are: labial, dental, palatal, alveolar, and lateral.

The labial click, written as a circle with a dot inside, is produced by pressing the lips together (combined with the posterior closure and air rushing in phe-

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p (b)	t (d)	k (g)	/	ǂ	!	//
	ts	kh	/g	ǂg	!g	//g
	s	x	/h	ǂh	!g	//h
m	n		/kh	ǂkh	!kh	//kh
	r		/n	ǂn	!n	//n
		h				
	Non-clicks		**Clicks**			

Table 2 Consonant system of Khoekhoegowap

nomena that characterize all clicks). Found only in Southern Khoesan and the isolate ǂHoã, the labial click is sometimes called the "kiss" click, though as Anthony Traill points out, it wouldn't be pleasant to be kissed by lips with that shape (see the photo on page 105 of Traill, 1985).

The dental click, written[10] with a slash (/), is produced by sucking the front of the tongue away from the upper front teeth. As I mentioned earlier, this is the click represented by English *tsk-tsk*. The palatal click, written with a slash though parallel bars (ǂ), is produced by cupping the front of the tongue on the area just behind the teeth. Since the area of contact for clicks is unusually large compared to other kinds of stops, these positions are only approximate. In fact, cineradiographic studies and other techniques show that what distinguishes clicks is more the shape and location of the air pocket formed.

The alveolar click (!) is formed with the tongue tip on the hard ridge just behind the teeth. The lateral click (//), sometimes used by English-speakers to urge horses to move, is formed with the right[11] side of the tongue drawn away from the upper right teeth. The alveolar and palatal clicks are abrupt clicks, while the labial, dental, and lateral clicks are produced with a much greater degree of friction.

The click accompaniment can be modified in various ways allowing different series of clicks to be formed. This is analogous to the way in which non-click consonants form various series: voiceless, voiced, aspirated, and so on; compare Tables 1 and 2. Table 2 shows the consonant system of Khoekhoegowap, a Central Khoesan language spoken by the Nama and Damara. Non-clicks are to the left; clicks to the right (the orthography is the traditional one for Khoekhoe).

Khoekhoegowap is the language of the Nama and Damara peoples, traditionally pastoralists herding sheep and cattle rather than hunter-gatherers as most speakers of Khoesan languages were in the past. Unusually for a Khoesan tongue, Khoekhoegowap has been a written language for almost a century and has a standard orthography. Table 2 uses this orthography. The symbols in parentheses (*b*, *d*, *g*) are used for words beginning with a low tone; phonetically they are the same as *p*, *t*, *k*. The *x* represents a fricative sound like the *ch* in German *ach*. The apostrophe represents a glottal stop like the sound in some peoples' pronunciation of Hawa'i or in the type of lava called 'a'a. All Khoekhoegowap words that don't begin with another consonant begin with a light glottal stop, not written in the traditional orthography.

There are four clicks and five types of accompaniment. The clicks in the top row are followed by a light glottal stop; those in the second row are plain voiceless clicks with the posterior closure in the same position as k. The third-row clicks are aspirated, that is to say, followed by a puff of air with the proviso

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daqendaqen	gums	g‡aq'a	spleen
dhadhama	butterfly	g‡huin	dog
goa‡'an	yesterday	g//kauhi	wild dog
zaq'ingad	fly	g!oq'in	red ochre
na'm	Black Korhaann	!'hoba	speak language (not Ju/'hoan)
tsam	to stalk		
tkare	tear (meat from bones)	n//aq'ara	to read, count
		uto!'hai	steering wheel
koq'm	hold back (pips in mouth)	‡'ang	to think
		/om	to tattoo
djxom	Pleiades	n!ore	country
dshau	woman	n!ui	moon

Table 3 Examples of Ju/'hoan vocabulary

that some of the air passes through the nose before the click is released. Clicks in the fourth row are, depending on the speaker, either strongly aspirated or followed by the fricative *ach* sound. Finally, the clicks in the fifth row are nasalized.

Khoekhoegowap, with only thirty-two consonants and eight vowels (the *a*, *e*, *i*, *o*, *u* of classic Latin or Spanish and three nasal vowels) has one of the simplest sound systems of any click language. Most Khoesan languages are much more complex. Ju/'hoan, for example, a Northern Khoesan language spoken by some 20,000 people in Botswana, and Namibia, has forty-five non-click and fifty-two click consonants, a total of ninety-seven. !Xóõ, a Southern Khoesan language spoken by about 3,000 people, has even more.

Much of the additional complexity is in the click system. Ju/'hoan has four clicks and thirteen types of click accompaniment. In addition to the accompaniments found in Khoekhoegowap, Ju/'hoan distinguishes voiced and voiceless clicks, has three different kinds of aspirated click, an ejective click pronounced with extra-strong friction, and a number of voiceless clicks preceded by a brief period of voicing. This last distinction, found also with the non-click consonants, seems to be unique in the world's languages. Table 3 presents some examples of Ju/'hoan words.

The examples are given in the orthography accepted by the Ju/'hoan, who are beginning to produce their own written materials. As Table 3 demonstrates, Khoesan vocabulary isn't limited to concepts that we, from our high-tech viewpoint, might consider appropriate to "primitives"; contemporary Khoesan speakers have borrowed or created words for modern concepts. At the same time, they may make precise distinctions not available in English without paraphrase such as !Xóõ *sam* "sip a hot drink" vs. *qom* "sip a cold drink" or *!'uni* "antecubital fossa, i. e. inside of the elbow" vs. *g‡qhuli* "elbow."

Although Ju/'hoan has the same five oral and three nasal vowel types as Khoekhoegowap, its vowel system is nevertheless far more complex due to the use of a number of distinct vowel "colorings," which can be very striking to a non-Khoesan ear.

Nasalization is a simple example of vowel coloring. As a vowel is produced, the velum, the tag of flesh that closes off the nasal passages from the mouth, is raised, permitting some of the air current to escape through the nose. The nasal passages act as a resonating chamber, imparting a distinctive coloring to the vowel.

All of the Khoesan languages have nasalized vowels. Some of them also su-

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	Non-click		Click	
Modal	go	flower	g!a	rain
Breathy	goho	grass sp.	g!ah	to dry
Laryngealized	go'a	gape	g!a'ã	bitter
Pharyngealized	goqru	lizard	g!aq	to belch
Lrgd./Phrgd.	goq'ori	weaken	g!aq'i	maggot

Table 4 Vowel types in Ju/'hoan

perimpose on the oral/nasal contrast. Others contrast based on differences in the way voicing is produced or changes in the shape of the vocal tract.

Ju/'hoan has four series of vowels: modal, breathy, laryngealized, and pharyngealized. In English and indeed all languages, vowels generally have the type of voicing called modal voicing in which the vocal cords vibrate as a whole. But it is also possible to hold the arytenoid cartilages[12] steady while allowing the rest of the vocal cords to vibrate, producing a softer, more hoarse type of voicing called "breathy voicing" or sometimes "voiced whisper." This type of voicing can be observed in English in the way many people pronounce an intervocalic *h* as in "*ahead.*" This is sometimes called a voiced *h,* but the voicing here is produced in a way quite different from the way in which vowels are normally voiced.

If the vocal cords are brought together, cutting off the air stream, and then allowed to vibrate again, the voiceless hiatus in the vowel is known as a *glottal stop* and in many languages functions as a consonant. In some interjections in English such as the negative "uh-uh" or the "oh-oh" of self-reproach, there is a perceptible glottal stop between the syllables. If the vocal cords are tightened to a point where they are not quite touching in an almost-glottal stop, the creaky quality (something like having a scratchy voice at the beginning of a cold) imparted to the vowel is called laryngealization. In Ju/'hoan, vowels can also be laryngealized.

The space between the pharyngeal wall and the back of the tongue is called the pharynx and if the tongue is bunched in such a way as to retract the tongue root, it produces a type of vowel called pharyngealized. The acoustic effect of this in Ju/'hoan is to give the vowel a distinctive strangled quality. Pharyngealized vowels can also be laryngealized, adding a fifth series of vowel quality; and since all of these can be either oral or nasal, the resulting vowel system is one of marvelous complexity.

An even more unusual vowel type is found in !Xóõ, a language spoken in Botswana by about 700 people. These vowels, called among other terms "rough," "strident," or "epiglottalized," are characterized by irregular and quite noisy vibrations of the epiglottis. In fact, according to Anthony Traill, the linguist who first described these vowels in detail, for part of the vowel the vocal cords are not vibrating at all. Auditorally, Traill notes, the impression may be like that of certain belches.

But are these languages as outré as they are sometimes made to sound? Certainly from the standpoint of most contemporary cultures, clicks are among the more exotic speech sounds, but it is interesting to look at them from both points of view. On the "exotic" side of the question, clicks are undoubtedly rare. As I noted at the beginning of this article, clicks are found as regular speech sounds only in a narrow band stretching from South Africa to Tanzania, though in the past they may well have had a wider distribution. Clicks are

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also unusual in the extent to which they dominate the sound systems of those languages that make use of them. By a rough estimate, 70% of vocabulary items in !Xóõ begin with clicks.

Nevertheless, clicks are actually well behaved sounds. They can all be described in terms of the same parameters that are used for other consonants and they occur in regular series that parallel the series found in non-click sounds as shown in Table 2. Clicks also undergo regular sound changes just like other consonants. For example, Kxoe, a Central Khoesan language spoken in Botswana, has undergone a process known as Click Loss in which all examples of the alveolar click have been replaced by the click accompaniment. Put another way, the influx or click proper has been lost, leaving the click accompaniment. As a result, Khoekhoegowap *!gari* "hard," *!gom* "heavy," *!ao* "fear," *!noas* "porcupine," correspond to Kxoe *kyeri*, *kom*, *'ao*, *ngwe*, whereas *ǂaop* "heart" and *ǂnoa* "quarrel," beginning with a palatal click which is not subject to the change, correspond to Kxoe *ǂao* and *nǂgwe*.

The Khoesan languages, spoken by small, migratory populations, were never easy to study, and unfortunately local governments generally regarded them as not worthy of it. Much of the research on which this article is based has been done in the last fifty years as techniques for studying languages in the field improved and the Khoesan-speaking peoples have become more settled. Given the rate at which minority languages are vanishing, it is unlikely they will all survive beyond the next century, though there are hopeful signs like the literacy programs supported by the Ju/'hoan and Kxoe.

The click languages are of great importance to theoretical linguistics because they help to define the boundaries of what is possible in a phonological system. One of the functions of science is accounting for the facts; so if linguistics is to be regarded as a science, then linguists must be able to explain why languages have the properties they do—for example, why some sounds are basic to all languages and others are peripheral. But the explanatory power of a scientific model depends crucially on the range of data available. And if all the click languages were to vanish, what linguist a few thousand years from now would be likely to imagine any language ever existed like *Ju/'hoan Kokxui*, "the language of the Real People"? ■

Click Lore

•Click languages may also use clicks as interjections. When disgusted, the Sandawe say, "Ah, //."

•Speakers may render the same word in subtly different ways, a quality we call "accent" when speakers of different dialects or regional variants produce the same utterance. Clicks may also be pronounced with an "accent." For example, Sandawe speakers sometimes replace the alveolar click ! with a *tongue slap:* the tongue tip is placed on the hard gums and then the blade of the tongue slapped down hard on the floor of the mouth.

•The Southern Khoesan language !Xóõ has words meaning "make a — click." For example, /'aa/'aa "make a dental click"; ǂ'i˜iǂ'i˜i "make a palatal click"; //'aã//'aã "make a lateral click."

•The alveolar click was referred to as a retroflex click in some early studies and its symbol, the exclamation point, is derived from a dental click slash / with the dot under it that linguists use for retroflex sounds.

Endnotes

Note 1. There are many theories about the name's origin. Per Schapera (1965: 44), it is from Hüttentüt, an onomatopoeic word for "stutterer" applied to the people by the early Dutch settlers.

Note 2. The phoneme inventory of English discussed here is based on my own speech: standard Midwestern American with a light overlay of Minnesota and Wisconsin regional speech. Many speakers of English will have different contrasts. For example, Americans from the Dakotas, lacking the a/o

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contrast, pronounce *dog* and *log* as "dahg" and "lahg" to rhyme with *Prague*. But in the UK, many speakers pronounce the words *not* and *cot* (for me [nat] and [kat]) with the same vowel as my *dog*, *law*, *fought* and *all*; that is, their *not* rhymes with my *naught*.

Similarly, many Americans only have ž within a word like leisure [lɛžɘr] and never at the beginning.

Note 3. English speakers who have ž only word-internally in words like *leisure* [lɛžɘr] pronounce this word [džanrɘ]; others, like me, pronounce it [žanrɘ].

Note 4. The traditional scholarly name for these languages is derived from the Khoekhoegowap words *khoe* "person" and *saan* "gatherers." In earlier literature, it is usually spelled Khoisan; at present, the spelling Khoesan, closer to the etymology, is preferred.

Note 5. A language isolate is a language without known relatives. For example, the Basque language, spoken in Spain and France, is the sole modern survivor of a group of languages spoken in the Iberian area before Indo-European speakers arrived.

Note 6. The Bantu language family includes well-known languages like Swahili, Herero, and Kikuyu.

Note 7. The most familiar Cushitic language is Somali.

Note 8. There are less than a dozen surviving N/u speakers, all in their seventies and eighties.

Note 9. For a description of one of the newly described clicks, see the (quite technical) paper by Miller and Sands (2000). Also for current work updating the concept of click accompaniment see Miller, Brugman, Sands, Namaseb, Exter, Collins, unpublished.

Note 10. The Khoesan words in this article are cited in the orthography used in the published dictionaries; for example, Ju/'hoan words are in Dickens' orthography. The click symbols discussed on p. 41 are those currently used in IPA (the set of symbols for transcribing languages recommended by the International Phonetic Association) but other symbols are used. Some readers may be familiar with Zulu/Xhosa usage where /, ! and // are written c, q, x.

Note 11. Typically on the right side but this varies with the individual much as handedness does.

Note 12. The arytenoid cartilages are a pair of small three-sided pyramids attached to the larynx, functioning to tense or relax the vocal cords.

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Dave Creek

No Traveller Returns

Beings can rationalize the darnedest things.

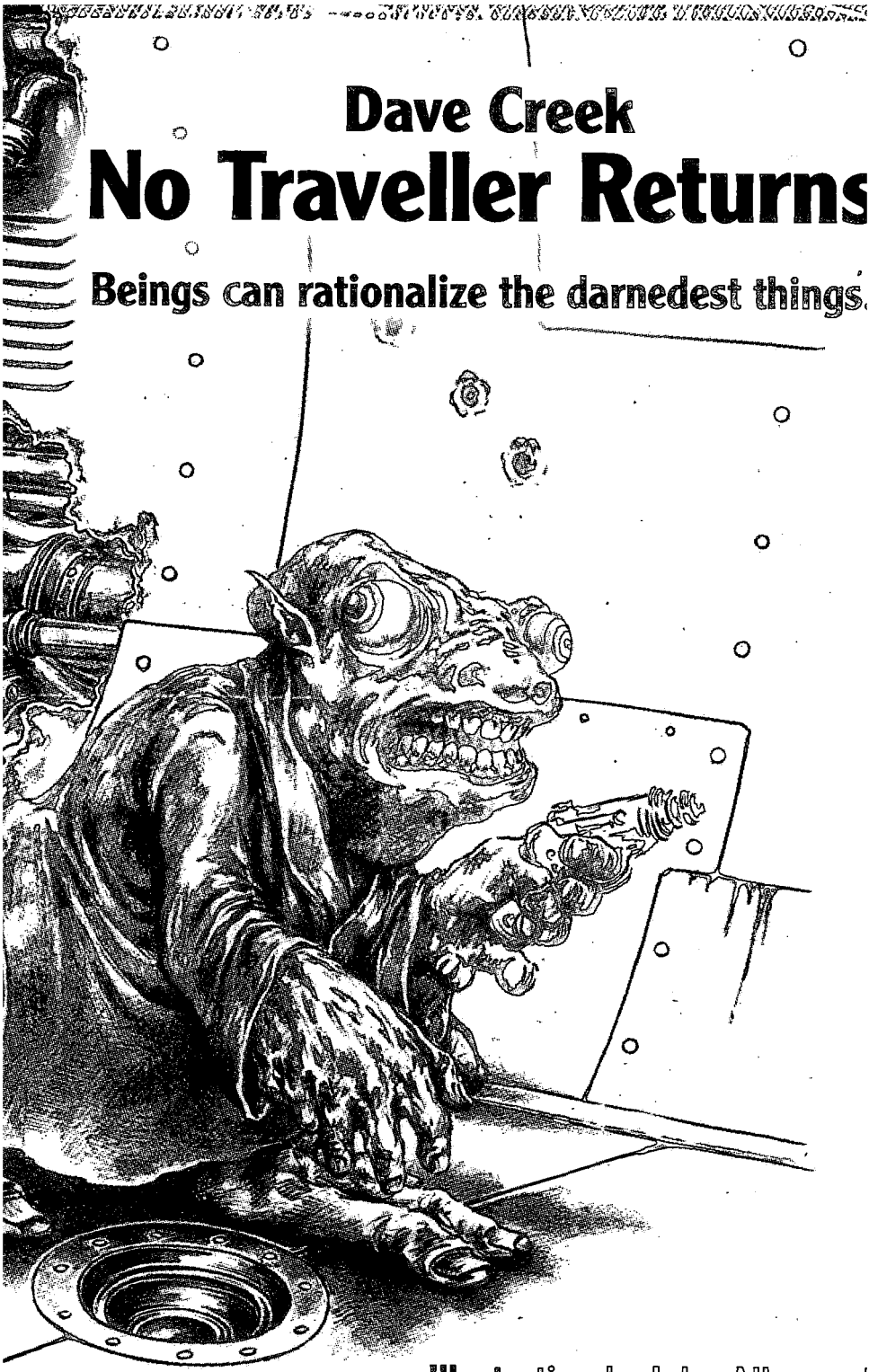

Illustration by John Allemand

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All of Mike Christopher's suspicions were confirmed as the Sobrenian starcraft he was piloting, the *Atir*, exited stardrive with a lurch that nearly sent him sprawling from his seat. He turned to the craft's owner, Votana, and snapped, "You shouldn't have skipped that stop at the Laradarmel System. This ship is too short of fuel and in too bad a shape to go any farther."

Votana stood just behind Mike. The Sobrenian's broad, rough-skinned hands wrapped his robes tighter around his torso, which was three times thicker than a human's. Those robes were of a plain blue material, without threads of a different color running through them, indicating that Votana was low in the Sobrenian social hierarchy. His eyes swung independently in their sockets, one examining the *Atir*'s controls, the other looking down his blunt snout at Mike. Votana spoke, and Mike's implanted datalink supplied the translation: "It doesn't matter. We're here."

Now it was Mike who glanced at the sensors. There—about a hundred thousand K distant—some kind of space station. "What is it?"

"I've arranged for passage for both of us aboard a Kanandran freighter. I knew the *Atir* would never be able to take us farther than this system. We'll get you back to your starcraft. What is it called?"

"The *Asaph Hall*," Mike said. He got up from the pilot's seat to stand over Votana. The top of the Sobrenian's head only came up to his shoulder. "Listen, I made a big mistake when I hitched a ride with you from the conference on Goldsmith's Planet. You've been in too much of a hurry and cut too many corners. And I really knew something was up when you insisted I help you pilot."

Both of Votana's eyes looked upward at Mike. "That's true. Sobrenians don't usually place much trust in humans."

"So give. Who's chasing you? And what station is that?"

"As for who is chasing us, that's a personal matter. Where we're headed—it's called the Station of the Lost."

Mike felt every muscle in his body tense up. "Are you insane? Every misfit and outlaw in this sector ends up there. No government, no laws—just anarchy."

"Except at its so-called southern tip, where there's a port. Some trade, mostly illicit, goes on there. But if there's no government, who's to say something is illicit?"

The *Atir* shuddered again. Mike returned to his seat and did a quick systems check. "We're in worse shape than I thought. The in-system drive is seizing up. We'll be adrift in just a few moments."

Votana pushed Mike aside and entered a string of commands into the pilot's console. "I've lost most of our relative velocity with the station—enough that my lifepod should be able to get us there." Votana took a bracelet off his wrist. "This control bracelet contains my family's codes. Wearing it will give you access to the lifepod. Go prepare it."

Mike knew better than to wait for a "please" from a Sobrenian. He took the bracelet and went to the rear of the ship, grabbing his jacket that held his stunner and a few emergency rations.

The pod hatchway opened at his touch. He squeezed into the pod, which would barely hold two Sobrenians in comfort, let alone one Sobrenian and a taller human. He checked out the pod with the knowledge of Sobrenian systems Votana had imparted to him over the past few days.

Nothing he saw gave him confidence in the pod's ability to save them. He laid in a course to the station anyway. Then Votana arrived, carrying a container that looked like an overly wide suitcase. Mike recognized it as a stasis case, nearly a meter square and eight centimeters thick. He asked Votana, "When's the last time this pod saw some maintenance?"

As Votana squeezed into the pod, Mike had to position himself into a seat much too small for him. The Sobrenian said, "You needn't concern yourself with my

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maintenance schedule," and wedged the bulky case against one side of the pod.

"What the hell's in there?" Mike asked.

"Also none of your concern."

"It's something alive, isn't it? Is that why someone's after you?"

"Human, I'm allowing you in this pod because I promised you safe passage to your home craft. If you wish to ask too many questions, you may stay aboard the *Atir*."

Fine, Mike thought.

Votana strapped himself in. "We're ready for ejection. Give me back the control bracelet."

Mike returned the bracelet to Votana and pulled on his own safety straps. Though Sobrenians were shorter than humans, their torsos were considerably bigger, and the straps hung loosely around his middle. "Great," he muttered, as Votana punched the eject button.

Mike's back was pressed against the side of the pod with a force that nearly took his breath away. In the next moment, the pod was in freefall, and it was all Mike could do to keep his lunch down. "Votana," he gasped, "You'll have to guide us to the station. I don't . . . feel so good."

"I never realized humans were so fragile."

"Let someone kick *you* in the ass, then churn up your stomach contents, and we'll see how you feel."

Mike watched Votana check the pod's minimal instrumentation, then check them again. Uh-oh, he thought.

Votana said, "Two thrusters are out. Did you not see this before we launched?"

"I saw a *lot* of problems, but no, that one I didn't catch. And we'd have been far past the station by the time we'd have fixed it."

Votana busied himself with the pod's controls again, which Mike translated as *yes, Human, thank you very much for pointing that out.* He asked, "So what's that mean? Can't we make it to the station?"

"We can, but only to the wrong end."

"What does that mean, the 'wrong end?'"

Votana looked at Mike. "I told you of the port at the southern end. Our vector is a narrow one, and without those thrusters we cannot aim there. We must dock at the northern end and travel through the length of the station to the safe port."

"I don't suppose there's a convenient transport tube that'll take us there in a couple of minutes."

"Any transport tubes are purely local, when they function at all. And the various Galactic species on the station are very fond of protecting their perceived territorial rights."

Mike asked, "And how big is the station?"

"Approximately ten and a half kilometers long and five wide. Much of it is densely populated. Some areas have seen outsiders enter, but have never seen one leave."

Mike looked out a port. His first impression of the Station of the Lost was of its immensity. Votana had told him how big it was, but Mike had imagined a smooth exterior of the kind you'd see on a human space station, with the occasional sensor cluster, viewport, or docking bay the only break in an efficient, ordered design.

This, however—was something of a different order. The station's exterior was festooned with add-ons—equipment pods, life-support modules, even former lifepods apparently being used as living quarters. Layer after layer, kilometer after kilometer, Mike couldn't see anything he recognized as the skin of the station itself. The wealth of detail was unfathomable. No wonder it's called the Station of the Lost, Mike thought. And it's a place of mystery—no one even knows what species built it centuries ago, then abandoned it.

The station grew larger and larger, and Mike realized their pod wasn't slowing.

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"Hold on," Votana said. "This could be a hard dock."

It was. Mike got the worst of it, tangled in his loose harness that simultaneously threatened to choke the life out of him as it wrapped around his neck, yet failed to fasten him securely enough to keep his body from bouncing around in the close quarters of the shuttle.

Then things settled down. At least the pod's secure, Mike thought, or my lifesuit would've snapped on. He was hurting at the back of his head and in both arms and legs, but Votana was doing all the complaining: "Get your feet out of my face, Earther! Has your translator broken? Pay attention to me."

Mike's hands reached out, found purchase, and he guided himself around so he and Votana were facing one another. The Sobrenian said, "We're getting out of this pod as quickly as possible."

"We don't know what kind of reception we're likely to have out there. Shouldn't we—"

"I've done business here before, though seldom in the wild areas. But I know that even presentients such as humans and other galactic species can be more dangerous than you might think. Our biggest advantage is speed."

Votana popped the hatch, and Mike's ears popped as well from a slight change in air pressure. Votana grabbed his stasis case, held it close, and jumped through the opening.

Mike pulled himself to the hatch. "Hey, Votana, I'm glad you can do that, but I'm relegated more to squeezing than springing, here. Could you wait just a minute?"

Mike finally extracted his larger human form from the pod and tumbled onto the deck. He was relieved to be free of the musty Sobrenian smell, but the station's atmosphere wasn't much better, having a metallic tinge to it that he hoped wasn't toxic.

He saw Votana's feet just in front of his face, and the stasis case next to them. "Hey, Votana, why are you just standing there—" Mike fell silent as he saw four more Sobrenian feet just past Votana's, along with what looked to be a pair of human boots. He looked up.

Two Sobrenians, clothed in rags rather than robes, and one human stood there, holding long metal pipes. Mike expected just threats and bluster from them, but instead the three rushed him and Votana.

Mike was just struggling to his feet and fumbling for his stunner when Votana pulled a disruptor from his robes and fired three quick shots. The two Sobrenians' and the human's death agonies were cut off midscream.

Mike could only stare as Votana pulled on Mike's sleeve. "Follow, Human. We must move quickly."

"What the hell was that about?" Mike demanded as he stepped quickly to keep up with Votana, who was heading down a narrow corridor crowded with abandoned air-recirculation modules, replicator units, twisted lengths of rusty pipes, tangled cables, and any number of devices whose function he couldn't fathom. The station's grav, at least in this area, was just a little under one G.

"We were in danger," Votana said as he holstered his disruptor and picked up his stasis case. "I defended us. You notice I killed the Sobrenians as readily as the human."

"You might've given them a chance to run away."

Votana paused at an intersecting corridor, then went left. He said, "Those three wouldn't have given us a similar chance."

"If they have any friends, they're liable to be pretty pissed off!"

Moments later, they discovered an access tube to a lower level. It was more of the same, dirt and debris, twists and tangles of cables and crumpled metal. Votana told Mike, "Those three would have been the only Sobrenians or humans in the area. Like species claim like species, for whoever has the first opportunity to rob, or rape, or kill."

Mike said, "Then maybe I need to thank you."

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"Have you ever killed before?"

Mike held his breath. This was the *last* conversation he wanted to have right now. "Just once."

"A fellow human?"

"No. A Jenregar queen." He remembered: The queen's carapace flamed and she emitted a sharp scream in the half second it took for her to die. That scream shot through Mike's nervous system like a lightning bolt.

Votana emitted a soft hiss, dismissing Mike's concerns. "A species even farther away from sentience than Humanity. You were defending yourself?"

"The Jenregar was trying to take over a human habitat."

"You killed nothing, then."

I'm an explorer, Mike thought. I never got into this to become a killer.

He pushed those memories away as he trotted to keep up with Votana. "Will you *slow down* just a little? I think I deserve to know what going on here. Who the hell's following us?"

Votana halted and put down the heavy stasis case. Mike said, "That's getting heavy, isn't it? Tell me what's going on and I'll help carry it."

Votana looked all around. Mike fought that compulsion—he was determined to keep his attention, and this conversation's focus, on Votana.

Finally the Sobrenian said, "It's my . . . former employer, Urtogen. He's pursuing me from the Sobrenian colony Pride of Artonoran, on a personal matter."

Mike shook his head in exasperation. "Votana, I've bailed out of a starship, damn near been pummeled to death in that pod, had to watch you kill three beings in cold blood—and ended up deciding you did the right thing. So this has become pretty damn personal to me too!"

Votana picked up the stasis case and held it out to Mike. "Carry it awhile, then perhaps I'll tell you more."

Mike grasped at the case, only to have Votana pull it out of his reach. "Gently," the Sobrenian said.

"All right," Mike muttered, and took the case from Votana. He stalked off, a protesting Votana right behind him.

"Human, I—"

"Mike. You can call me Mike."

"I will refer to you as I wish."

Mike held up the stasis case and shook it, ever so slightly.

Votana said, "I will refer to you as 'Mike.'"

"Fine," Mike said, and ducked down beneath a twisted mass of coolant tubes. He squatted as far down as he could at first, then went to hands and knees. His head brushed a frighteningly sharp piece of metal that connected to some sort of module he couldn't identify.

Mike moved forward. He glanced back and saw an impatient Votana, who was clearing the debris easily just by ducking his head.

Mike's stomach growled. He was just about to dig into his jacket for a ration bar when a sharp skittering sound came from directly above. He flattened himself on the deck. When he looked upward, he saw nearly a dozen beings, all with slender arms and legs, and less than half a meter tall, scurrying away in all directions into the depths of the debris. "Garotethans," he muttered.

Votana huffed moist air from his snout. "Parasites."

Mike suppressed an urge to snap back at Votana. Sobrenians had conquered the Garotethan home world nearly two centuries earlier and used its inhabitants as menial labor, all but slaves. The Sobrenians referred to the Garotethans as their "ancillaries." The idea that many Garotethans appeared to enjoy the arrangement didn't make it any more agreeable to Mike.

And didn't explain what they were doing here, apparently unattached to any Sobrenians. Mike crept forward, but kept glancing around. Who knew what other beings might be lurking within this mass of metal?

That was when another thought occurred to him—Why doesn't Votana have a Garotethan companion? He referred to

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them as "parasites." Does he believe it's immoral to treat such beings as other Sobrenians do?

Or does he denigrate them because he can't afford them?

No time to think about such things. Mike was past the debris. Votana, his plain blue robes rustling as he walked, led the way down the corridor, which was relatively free of debris now. Mike followed and, without thinking, his right hand patted the stunner at his side. Grateful as he'd become that Votana's reaction at the port had been quick and merciless, he hoped the rest of their journey wouldn't entail any more deaths. *Especially mine or his*, he thought.

They went past a series of steaming vents, each emitting a different odor—a whiff of what smelled like sewage, and Mike gagged. Another combined lemons and the pages of old books; yet another, pineapple and dirty feet.

"Damn," Mike said. "This is a much more roundabout route than I ever expected to take just to get home."

Votana said, "Your worries are typical of lesser beings. And I thought you were bound for a rendezvous with your starcraft. This is not the route to Earth."

"The *Asaph Hall* is my home. When you're an artificial human, many people on Earth aren't very friendly."

"I see. Class or race prejudice. You are an outsider. Then perhaps we have that much in common."

Mike didn't even want to think about that. He realized this corridor was about to open up into a much wider and brighter area. He heard the bustling of crowds, the metallic sounds of machinery, and the *whooshing* of vehicles. He rushed up behind Votana and grabbed him by the shoulder. "Where the *hell* are we going?"

Votana raised his head toward Mike and looked down his snout with hooded eyes. "This is the marketplace in the center of the station. We may be able to lose ourselves here as we find a way to the southern port."

"A disturbing percentage of the people we've met here want to *kill* us!"

Votana wriggled his shoulder from Mike's grasp. "We must appear confident and stride right through the mass of beings here. Many of them are transients; the fact that no one has seen us before will not be unusual."

"Listen, you had me thinking all that was on this station was kilometers of wrecked corridors. You mean there's something like *civilization* here? What other surprises do you have in store?"

"I have no way of telling, Mike, because I do not know the extent of your ignorance regarding this place."

Mike could only groan in frustration.

Mike followed Votana into the marketplace. All his senses were assaulted: He squinted as his eyes adjusted to the bright light; he grimaced and covered his ears as a human fruit vendor's loudspeaker blasted its exhortations to buy; he nearly choked at a whiff of some noxious odor as he passed a methane-breathing Drodusarel who only came knee-high to him wearing a well-worn, leaky lifesuit; he groaned as members of every galactic species he was familiar with nudged him or stepped on his feet or pushed him aside.

As his eyes adjusted to his surroundings, Mike made out more detail. He estimated the marketplace was nearly five K across, the width of the station itself. The vendors were inevitably well armed, or had conspicuous bodyguards, and weapons seemed to be the merchandise of choice. A tripedal Kanandran's booth featured dozens of Earth Unity energy rifles that couldn't have been obtained legally. A Sobrenian customer was showing some interest in those rifles, and the Kanandran was demonstrating their use, with his major arms holding the rifle and the shorter minor arm jutting from his chest gesturing enthusiastically. The Kanandran had three eyes arranged equidistantly around his cranial bulge. The two eyes facing his Sobrenian cus-

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tomer stared intently at him, while the third covered his back.

Two Relajem shared the booth next to the Kanandran, but they had no wares. They were beings that were superficially snakelike, about two and a half meters long. They not only bore their young alive, as many Earthly snakes did, but the females suckled their young. And their bodies were covered with a fine fur, usually in a mottled pattern of brown and black. Mike wondered what these particular Relajem were selling. Perhaps they had violent or stealthy skills they were promoting.

Mike thought, I'm pretty sure that Cetronen paired symbiont in the next booth over would be prohibited from selling those disruptor grenades on most civilized worlds. A human woman approached the Cetronen and spoke to him, but her words were swept away in the overall din. The Cetronen minor, the smaller being who was held in the larger major's arms, touched a scanning wand to the woman's forearm and handed over three of the grenades.

Votana was headed toward the center of the marketplace. Mike's eyes widened at the sight of small shuttlecraft that appeared to burst from within the middle of the marketplace itself, headed toward the station's northern levels. There must be some kind of transit area in the middle of the station, Mike thought. Though the way some of those shuttles and skimmers are flying back and forth, it doesn't look as if there's any kind of traffic control. "Votana, you don't have any idea where you're going, do you?"

Votana only looked back at Mike for an instant, saying, "That is no concern of yours, Human."

I've had enough, Mike thought. He stopped cold, letting the flow of beings go around him. He grunted as a Cetronen pair ran into him from behind. The major towered over Mike, but it was the minor, carried in the major's arms, who spoke, as Mike's datalink translated: "You should be more careful, Human. The Station of the Lost is no place to make enemies."

All of Mike's muscles tensed, and he braced himself in case the Cetronen tried to assault him, but thankfully the pair went on. "I think that's all I've done since I got here," Mike muttered.

Mike had sudden second thoughts. Votana wasn't great company, but he was as close to an ally as he was likely to have here. He stood on tiptoe to try to spot him. Damn, he thought. Why did I have to partner up with someone from a short species? I can't see Votana for all the humans, Cetronen, and Kanandra.

He held the stasis case as high over his head as he could. Maybe this'll catch his attention.

Suddenly Mike spotted a commotion about twenty meters in front of him and heard shouted protestations in languages too numerous to be translated. It was Votana, hurrying back toward Mike, pushing through the crowd without regard as to whom *he* might anger, his plain blue robes flapping behind him. So far the Sobrenian was outrunning those few beings insulted enough to pursue him, but Mike could tell a Kanandran was about to catch up to him. Mike backpedaled, but found his back against the booth belonging to the Cetronen arms dealer. And Votana and his pursuers were about to catch up to him.

Dammit, dammit, he thought. He dropped the stasis case and pulled his stunner as Votana rushed past him. The tripedal Kanandran came under his sights, and he fired. The Kanandran's wide bulk tumbled, unconscious, toward the booth as Mike dove out of the way. The Kanandran struck one corner of the booth, hard, and it collapsed, sending disruptor grenades, disruptor pistols, and energy rifles flying.

As he raised himself up off the deck, Mike heard a myriad of sounds—safeties disengaging, shells slamming into chambers, targeting chips and energy packs powering up.

Votana returned to Mike's side and picked up the stasis case. "Stupid Hu-

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man," he said. "Now we may never escape this place."

We have just a few moments, Mike thought, while everyone tries to figure out who we may be aligned with and if they want to take the chance of making a lethal enemy. He grabbed Votana by the arm. "C'mon," he said, "let's get some distance between us and everyone you pissed off." He nearly had to drag a squirming, protesting Votana into the crowd, out of the transit area. "Calm down now. What's this about never getting out of here?"

Votana wrested his arm from Mike's grasp. "That Kanandran you shot was the captain of the freighter that was to take us off this station!"

Mike felt as if his head were spinning. "What the hell was he doing here?"

"*We* were late because of the time we've spent trying to avoid Urtogen. He'd heard of disturbances in part of the station involving a Sobrenian and a human and came to investigate."

"So what were you arguing about?"

"He was delaying taking me to his ship. He wanted to prowl the marketplace in search of new weaponry."

"Or so he said."

Votana asked, "What do you mean by that?"

"None of what you just said made a lick of sense, do you realize that? How did one Kanandran just happen to find us in a ten-K-long space station? Either he's the luckiest son of a bitch I've ever heard of, or he's been shadowing us so he can sell you out to Urtogen."

"He wouldn't! I've paid—"

"What one person can pay, another can top."

Votana said, "All this is irrelevant now. That Kanandran will never take us off this station."

They were headed into another ravaged section of the station. Mike ducked beneath a jutting beam. "Then we'll just have to hire someone else."

"I paid the Kanandran in advance. I have no more assets. What do you have, Human?"

"Me? I'm from a replicator economy, not a market economy."

Votana huffed his displeasure. "Meaning you *have* no assets."

Mike halted and tapped the stasis case in Votana's hands. "Something tells me what's in that case might be valuable. What if we traded it in for passage to a nice safe world where I can catch a ride to my ship, or at least to human space?"

Votana held the case close to his chest. "Unacceptable! Bringing this case along is the entire point of my journey. I must not be separated from it."

"What's *in* there, Votana? I'm not taking another step until you tell me."

"Then you will not take another step. I, however, must stay ahead of Urtogen. Good-bye."

Mike watched as Votana started walking down a dark, damaged corridor that had noxious fumes drifting down it. Water dripped rhythmically onto the floor, which was strewn with debris. But Votana didn't seem to be in any hurry.

Mike said, "Urtogen could have docked at the other end of this station, you know. He doesn't have to be behind you. He could come at you from any direction."

Votana stopped walking. He stood stock still for about three water drips, then slowly turned around. "We are bound together, you and I, it seems." He walked back to where Mike stood. "Returning to you is my only concession. It supersedes your request to learn what is in the stasis case."

Mike shook his head in frustration. "Then I guess I can take that other step. Where should we go?"

Votana pointed down the dark corridor. "We will continue the way I'd started. I spoke with several people before the Kanandran's attack. We should find a transport tube at an intersecting corridor."

"All right, let's go."

Mike led the way down into the dark

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corridor. He coughed violently as he passed through a cloud of fumes. Holding his hand to his face did little good. Once I get back to the *Asaph Hall,* he thought, I'm going to have a detailed bio-scan. I don't trust my personal med-tech to compensate for everything I've been exposed to.

After several minutes of walking, Mike ducked his head to avoid the sharp edges of yet another twisted frame of metal and walked through another cloud, this one thankfully only of water vapor. A couple more steps, the vapor dissipated, and Mike realized he and Votana had reached an undamaged section of corridor. Undamaged and apparently unoccupied. Another corridor formed an intersection just ahead.

Votana said, "The transport tube should be to the left."

From the corridor behind them came a loud crash of metal against metal. Mike whipped his head around and, through the vapor cloud, could just make out a small silhouetted form advancing toward them.

"It's Urtogen!" Votana said, grasping his stasis case closer to his body. "Hurry!"

Mike pulled out his stunner as he ran fast as he could behind Votana. He can get up a pretty good head of steam when he's frightened enough.

Votana rounded the corner just ahead of Mike, who had just stolen another quick glimpse of Urtogen, gaining only an impression of a vaguely humanoid shape about Votana's height. As Mike slipped around the corner, he nearly ran Votana down. "What the hell—?" Mike began, then he fell silent. One look at the large transport tube, and he understood why.

Garotethans surrounded the tube entrance, making chittering sounds and jumping around as if in ecstasy.

"Vermin," Votana muttered. The Garotethans were about three-tenths of a meter tall. Their skinny brown bodies were covered in dirty rags rather than the Sobrenian-style robes Mike had seen them wear while serving as ancillaries aboard Sobrenian starcraft. Several Garotethans jumped on top of cargo containers lined up in front of the pod and taunted Mike and Votana. In all, about two dozen of them were between them and the transport pod that they had to enter—quickly!—to escape Urtogen.

"It's a trap," Mike said.

Votana asked, "What do you mean?"

Mike pointed toward the transport pod and raised his voice to speak over the Garotethans' chittering. "They're in with Urtogen. Remember the first time we saw them in one of those damaged corridors? That was just before the Kanandran found you. They've been keeping tabs on us the whole time."

Votana's eyes swung independently in their sockets, one glaring at the Garotethans as the other gazed at Mike. "Then our choice is clear. We're trapped between the Garotethans and Urtogen." Votana placed the stasis case under one arm and pulled his disruptor from his robes. "The Garotethans are the less formidable adversary." Votana started down the corridor toward them.

"Wait a minute—" Mike began, but shut up when he realized he didn't have an alternative to suggest, and Urtogen was surely right on their heels. He ran to catch up. I really don't want to see anyone else die, he thought, even these distasteful Garotethans. Mike stepped up his pace and drew his stunner. Which means I'd better start shooting first.

And he did, rushing past Votana and squeezing the stunner's trigger until he'd cut down most of the Garotethans who'd been taunting them from on top of the cargo containers. They fell limply to the deck as Mike dove behind those containers.

The remaining Garotethans pulled out small stunners of their own and began firing back at Mike as he hunkered down behind the containers. Part of a beam caught him on his left shoulder. Mike groaned against the pain, but the shoulder quickly went numb. He could barely move his left arm, though.

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The Garotethans' chittering came from close by, and one of them jumped up on the cargo container and pointed a stunner at Mike. He tried to get his own weapon to bear, knowing he'd never make it, when every atom of the Garotethan's body was swept away in a blinding flash of energies.

Votana and his disruptor had saved him. Votana switched his aim to the rest of the Garotethans next to the transport tube and began destroying them without hesitation or mercy. The Garotethans turned their fire toward Votana, and though their aim was often wide individually, collectively they fired enough stunner bolts that Votana went down.

And around the corner came the humanoid form that Mike knew must be Urtogen.

Who was another Sobrenian.

This is getting just a little too goddamn complicated, Mike thought. He reached around the storage container and picked off a couple more Garotethans with his stunner. About four were still standing. Then Mike ran for Votana, aware every instant of how likely it was that he could find himself stunned, lying next to his reluctant companion.

He stunned another Garotethan who got just a little too close, then dropped his stunner and picked up Votana's disrupter. He aimed, not at the Garotethans, but at the ceiling just in front of Urtogen, and fired. A huge section of ceiling exploded downward and Mike held his uninjured right arm over his eyes against the flash, flames, and debris.

A pretty good distraction, if I say so myself, Mike thought. With his left arm nearly disabled, it was quickest for Mike to stuff both Votana's disruptor and his own stunner into the Sobrenian's robes. Under cover of the clouds of smoke roiling down the corridor, Mike scooped Votana up as best he could with his one good arm. He hesitated only as his gaze fell upon the stasis case. Dammit. If I don't take it, he'll insist we come back for it.

It took all of Mike's strength to hold Votana in his right arm and kneel to pick the case up with his partially paralyzed left hand, but he managed it. He started down the corridor as quickly as he could carrying a limp Sobrenian and the stasis case. In just a few steps, he'd outpaced the residual smoke and fumes from the damage he'd inflicted upon this area of the station.

Which left him no cover or concealment when dozens of additional Garotethans scurried from behind him out of that smoke and fumes and surrounded him, all pointing their tiny stunners at him.

And each dressed in smaller versions of Sobrenian-style robes.

Following the Garotethans out of the smoke was a Sobrenian male just a little taller than Votana and a number of years older. He'd retained the thick body typical of a Sobrenian, though, and in the way he moved, Mike sensed that he'd retained the formidable muscles of a younger Sobrenian. He wore robes of blue and green, made of fabric that also had lines of yellow and red running through them. This Sobrenian has a lot more status among his people than Votana, Mike realized. Those robes tell the tale. He also wore a control bracelet similar to the one Votana had given him momentarily to operate the lifepod.

Mike slowly placed Votana onto the deck, and his fingers slid over the disruptor and stunner hidden within the Sobrenian's robes. I'd be foolish to go for either one of them with the Garotethans covering me, Mike thought. *Wait.* Mike placed the stasis case next to Votana's still form, then stood and faced the older Sobrenian. "Urtogen, I presume."

"You are correct. I've been closing on you from the first moments you docked at the northern port."

Mike tilted his head toward the still form of Votana. "Why have you been chasing him?"

Urtogen looked down his snout at Mike, both of his eyes staring at him from their independent sockets. Beneath that

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searing gaze, Mike felt as if Urtogen were trying to discern the quality of his character simply by staring hard enough. He wondered how much this Sobrenian even knew about human body language and facial expressions.

Urtogen said, "Lesser beings shouldn't hear this conversation."

For an instant, Mike feared Urtogen was speaking about him, and his body tensed in the futile hope that he could protect himself from Urtogen and all these Garotethans. Instead, at a gesture from Urtogen, it was the Garotethans who scattered in either direction down the corridor and even up its walls and into the jagged hole Mike had blasted into the ceiling.

Urtogen pulled a disruptor from his robes and said, "Don't think to assault me. Besides being armed, I can call my ancillaries back at any time. Though they made most irritating company aboard the *Moravek,* my ship." He looked down at Votana. "Ah, he awakens."

Votana slowly lifted his head off the deck. He blinked several times, then his eyes opened wide. His voice was nearly a whisper. *"Father."*

Mike shook his head. Had his datalink malfunctioned? "Excuse me, did you say—?"

Votana held the stasis case close to his chest. "Yes, Urtogen is my father."

"I thought he was your employer."

Urtogen said, "I am both. But I would've thought 'father' would have been the more relevant description."

Votana sat up and coughed uncontrollably.

"Lie still," Mike said, kneeling next to Votana and placing his hand on the Sobrenian's back. His fingers brushed the outline of the disruptor and stunner beneath Votana's robes again. "You're still recovering from the stunner blast."

Votana lowered himself to the deck again and told Urtogen, "I do not justify myself before this *presentient*—this *Human.*"

Mike said, "You can't be telling me that I'm stranded on this station, that beings have *died* all because of some family spat!"

Votana said, "My father is a torturer."

Urtogen said, "My son has no appreciation of rare art."

Mike nodded toward Votana. "It comes back to the stasis case, doesn't it?" The tips of Mike's fingers tingled as he waited for an answer; he'd held that case more than once in the past day. What did it contain? A bomb? Rogue nanotech?

Urtogen said, softly, "Show him."

Votana lifted his head from the deck. "I promised myself I would never look upon her again. Until . . ."

Her? Mike thought. What the *hell* is in there?

Urtogen said, "Show him. I don't care that he's a Human. We respect all life, even the presentient."

Votana sat up again and fumbled at the latches on the stasis case. He said, "You don't respect the life that's hidden in here."

"That's different."

Votana gave Urtogen an angry glare that Mike interpreted as *No, it's not,* but opened the stasis case.

It seemed as if the entire station grew still as Mike looked down at the case's contents. He couldn't perceive at first exactly what he was seeing—the case had a shimmering energy field protecting its contents. The case looked as if it were filled with some sort of organic matter. Mike knelt next to it for a closer look and thought he could perceive features of some sort within that mass—*Sobrenian* features, nearly in profile, with a snout even blunter than was typical and skin even rougher than the norm. The mass of flesh below the head looked as if it had melted into folds and flaps of skin resembling a Sobrenian's robes. Mike saw no evidence of arms or legs.

Urtogen asked Mike, "Do you enjoy abstract art forms?"

Mike looked up at him, then at Votana. "Is that what this is supposed to be?"

Votana said, "It's organic art."

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Mike's eyes widened. "I've heard of this among some human cultures." He glared at Urtogen. "It's not generally approved of."

Urtogen said, "You should not condemn what you do not understand. A living organism designed as an art form—it grows into shapes that cannot be predicted, which adds to its appeal."

Votana gently closed the stasis case and held it against his chest again. "It's sentient. Its cries for help, its appeals for someone to kill it are considered 'found art.' You told me you are an artificial human."

"Yes," Mike said. "But I wasn't created for anyone's enjoyment or entertainment."

"All the same, you should be able to appreciate how casual cruelty toward this being is only acceptable because she is different."

Urtogen said, "You should be able to appreciate the artistry! My son helped me develop this technology, but he became squeamish. And he became a thief! He stole this subject from me, forcing me to pursue him and retrieve it."

Votana told Mike, "One other thing you should know. This 'subject' is my *sister.*"

Mike, in turn, glared at Urtogen, who said, "I used the genetic material at hand—my own and that of my mate, Otana."

Mike pointed at the closed stasis case. "To create *that?*"

Votana said, "She would only be the first. He would create an entire portfolio of such beings, for others' pleasure and his own enrichment. He's been developing this technology in secret, on the colony world Pride of Artonoran. I wanted to take her to our home world and send this case plunging into the atmosphere, so she could die peacefully, so her ashes would settle onto what should have been her home. I knew my father would try to intercept me."

"That's enough," Urtogen said. He told Mike, "Give me Votana's disruptor." As Mike reached into Votana's robes, Urtogen told him, *"Carefully."*

The fingers of Mike's right hand eased past his own stunner and grasped Votana's disruptor, for two reasons. First, this wasn't the time to make a move, with Urtogen's weapon pointed right at him, and secondly, he intended, when he did make his move, to use the stunner. The very idea of using the disruptor brought up the image of the burning, screaming Jenregar queen. Mike lifted the disruptor by his thumb and one finger and placed it on the floor.

Urtogen kicked the disruptor away and asked Mike, "Where's your stunner?"

Mike blinked as he realized he'd come *this* close to an involuntary glance at Votana's robes. "Lost in the battle."

"You should know—my clients indicated an interest in such an art form. Therefore I created one."

"They enjoy watching someone suffer?"

"It is not *someone,* Human. It is a *thing.* Sentient and aware, but a thing, all the same." Urtogen gestured toward Votana with his disruptor and told Mike, "Help him up."

As Mike bent over to grasp Votana's arm with his still weak left hand and made as if he was about to brace Votana's back with his right, he was all too aware of his pulsing heart, the sheen of perspiration on his forehead, and his face beginning to flush. I really hope Urtogen isn't good at reading human emotional reactions.

His right hand dug deeply into Votana's robes and then the stunner was in that hand and he was bringing it around the side of Votana's body and firing at Urtogen.

Who fell, limp and silent, to the deck.

He let go of Votana, looked at the still form of Urtogen, and said to the unconscious Sobrenian, "You talk too much, you know that?"

Votana sat up. "This is marvelous, Hu—*Mike.* Now we can—"

Mike stunned Votana too. "And so do

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you." He gathered up Urtogen and Votana's disruptors, took their control bracelets from them, picked up the stasis case, and ran as quickly as he could down the corridor.

He didn't continue toward the southern port; instead, he headed "north."

Once at the northern dock, Mike easily gained entrance to Urtogen's ship using his command bracelet. He was grateful now for Votana's earlier insistence that Mike help pilot the *Atir.* It was a simple matter for him to ease the *Moravek* away from the Station of the Lost and set a course.

Not for the *Asaph Hall.*

For the Sobrenian home world.

It took the better part of a week for Mike to pilot the *Moravek* there, a place no human had ever visited. It was a world largely shrouded beneath dark, thick clouds. Much of what little land area Mike could make out was rough terrain, pockmarked with craters.

The aftermath of the comet strike, Mike thought. Nearly three hundred years earlier, that impact had nearly wiped out the Sobrenian species. Surviving that massive tragedy was the primary reason Sobrenians considered themselves inherently superior to other galactic species.

Several military craft converged upon the *Moravek* demanding to know how a mere Human had obtained Sobrenian control bracelets and what his intentions were.

The commander of the lead Sobrenian ship was surprised and clearly suspicious when Mike powered down the *Moravek*'s minimal defenses and weapons and invited him aboard. That commander declined the invitation personally but sent over five heavily armed security personnel, who came onto the *Moravek* with energy rifles set to disintegrate mere flesh. They made sure to rough Mike up just a little, just to show him who was boss, but fell silent when Mike showed them Urtogen's "organic art."

Mike and the Sobrenian commander quickly reached an agreement. The security team programmed the *Moravek*'s navigational computer to the course Mike suggested and locked it in. Then it left.

Mike trusted the Sobrenian commander to respect their agreement; he knew most Sobrenian military commanders prided themselves on their integrity, even toward "presentients."

He also knew the commander would blow the *Moravek* out of the sky if Mike deviated in the slightest from the programmed course.

Mike sat passively in the pilot's chair, watching as the *Moravek* skimmed the planet's atmosphere. The glare from the forward viewscreen became red hot, then white hot, and finally Mike had to shut his eyes against that glare before the screen stepped down the brightness—apparently Sobrenian eyes could withstand brighter light than human ones.

A small cube display in front of him showed Mike what happened next, as the *Moravek* launched a probe into the Sobrenian home world's atmosphere, at a much deeper angle than recommended. Which is the whole idea, Mike thought. He watched the sensor readouts as that probe, with Urtogen's organic artwork aboard, quickly heated to dangerous levels, then broke up. Votana's sister had come home, and was dead.

I'm an explorer, Mike thought. I never got into this to become a killer.

As the *Moravek* rose out of the Sobrenian atmosphere, however, and set a course that would eventually take him to the *Asaph Hall,* to home, he saw no reason to grieve for her death, only for her life. ■

(EDITOR'S NOTE: Mike Christopher appeared earlier in "Some Distant Shore" [September 2007], "Swarming Korolev" [November 2000], "Pathways" [May 2000], and "A Glimpse of Splendor" [February 2000].)

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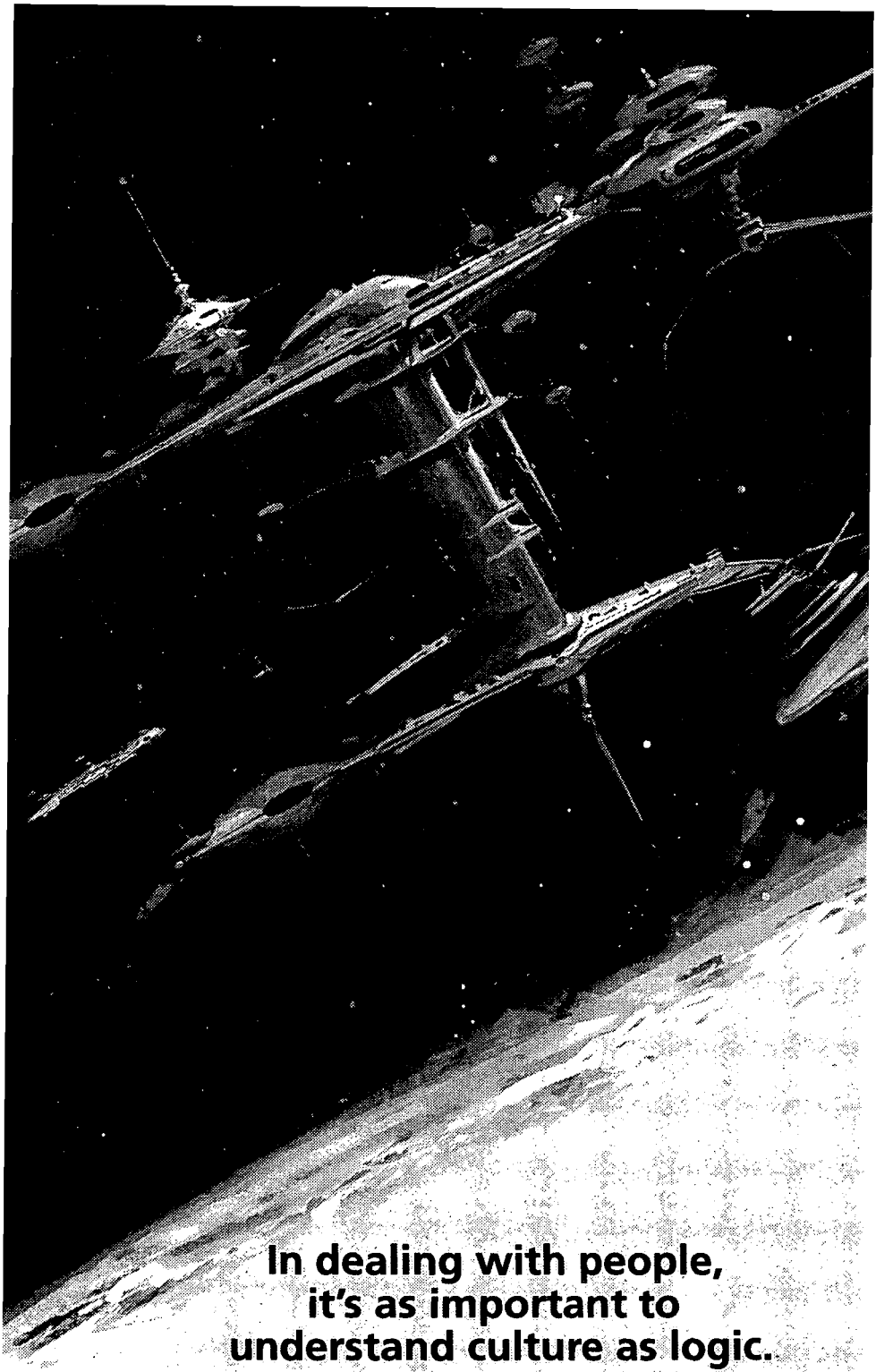

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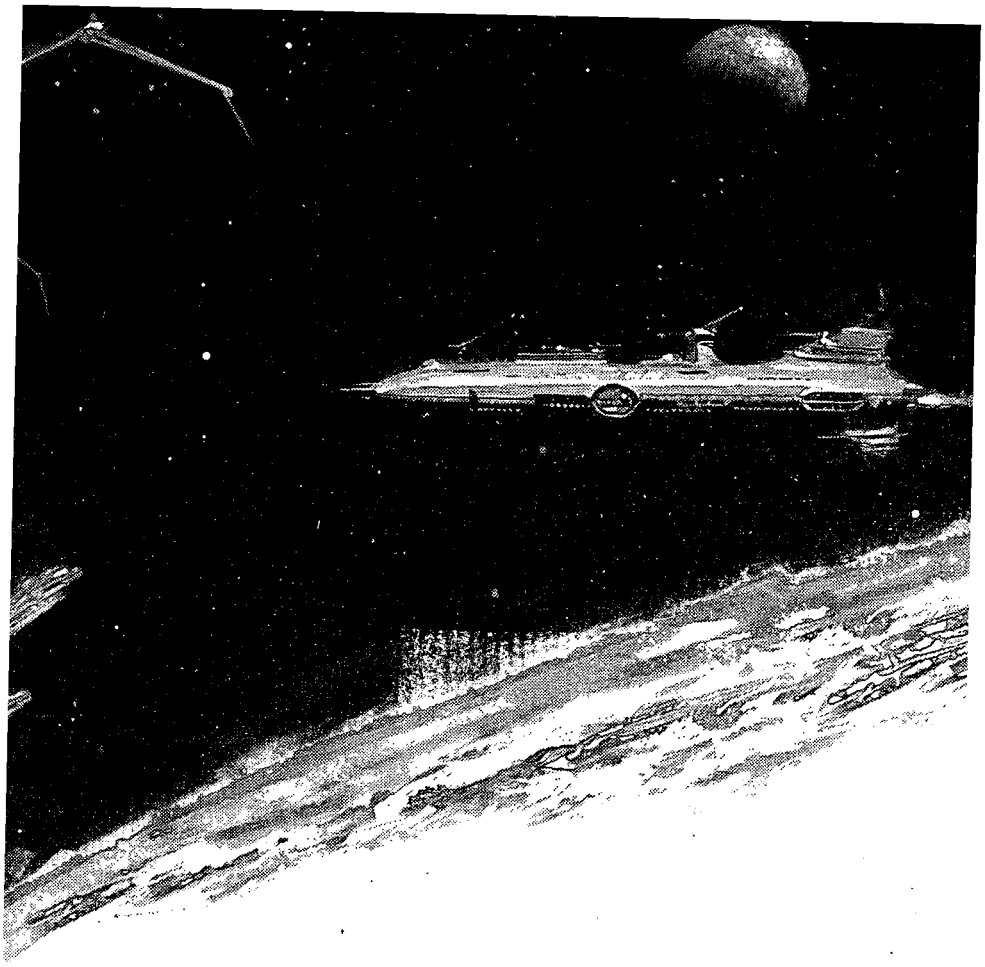

The Ashes of His Fathers

Eric James Stone
Illustration by Vincent Di Fate

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September 27, 2999 C.E.

Mariposa Hernandez arched her left eyebrow as she looked at the cargo manifest the freighter pilot had just downloaded to her pad. "Ashes?"

She checked the planet of origin on the form, and her implant revealed Jeroboam was 37,592 light-years from Earth. Her puzzlement increased—in the three years she'd worked on Orbital Customs Station 27, she'd never seen a freighter from so far out. It must have taken him over two years in that antiquated ship. "You've come thirty seven k-lights with nothing but ashes?"

From behind the diamondglass wall of his quarantine cell, the pilot shrugged at her. "Our planet ain't got much worth trading. Not that the ashes are for sale."

She looked up the pilot's name on her pad: Shear-jashub Cooper. "Mr. Cooper, why are you trying to import ashes to Earth if they're not for sale?"

"Religious reasons." His tone was matter of fact.

"I see," she said, as if his explanation made sense. She had a vague memory that her Catholic great-great-grandmother sometimes got marked on the forehead with ashes, so she queried her implant about the religious significance. Nothing relevant to the importation of ashes from other planets came up.

She looked down at her pad. Ashes. "Ashes of what?" she asked. "Are they biological?"

Cooper nodded slowly. "They are the ashes of the 9,746 founders of Jeroboam Colony. I'm returning them to the planet of their birth."

"Human remains?" She queried against Earth Customs and Immigration Enforcement Regulations and found several subsections devoted to importation of human biological material. "You'll need to get special clearance for that. I'll send the forms to your pad."

"Thank you." He smiled at her.

"I'll also need to run a thorough scan on your cargo. I hope that doesn't offend any religious sentiments, but we can't risk—"

"That's fine."

She pointed to the chair at the desk inside the quarantine cell. "Please sit and put your arm on the desk so the system can take a blood sample." She sent a command to the system through her implant, and a holographic image appeared at the desk to show Cooper the proper way to put his arm.

"Blood sample? You folks take customs seriously." He smiled as he spoke, and he walked to the desk and superimposed his arm on the holographic one.

A restraining field flickered to life across his forearm, as a robotic needle arm emerged from a hidden compartment of the desk. With smooth efficiency it scanned his arm for a good location, inserted the needle, and let blood flow through one of its transparent tubes. After about thirty seconds, it withdrew and stowed itself.

"Seems like an awful big sample," said Cooper.

"We want to be sure we catch any unknown disease elements in your blood."

A hatch opened on Mariposa's side of the quarantine wall, and she took out the vial of blood.

"Medical says this is the optimal sample size. It'll take them a few hours to run the tests," Mariposa said. "If you're cleared, you'll be allowed into the public areas of Station 27. We have some restaurants and various entertainment facilities. Your ship will remain under quarantine, though, until I've had a chance to examine it."

He grinned at her. "Any chance I could buy you a meal?"

Mariposa stared at him. It took her a moment to realize that this was probably a signal of attraction on his part, rather than an attempt at bribery.

He spoke again before she could respond. "I'm sorry. I didn't mean to offend you. You probably get pilots asking you out all the time."

"No, actually," she said. "Most of the pilots that come through here know better. All Earth Customs Agents have their sex drives suppressed during tours of duty, so

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we can't be seduced into bending the rules."

To Mariposa's surprise, Cooper blushed. "Well. I guess the Elders were wrong."

"The Elders?"

"The leaders of Jeroboam. They warned me all the women of Old Earth were temptresses who would try to lure me to their beds."

Just before reaching Medical, Mariposa got a thoughtcall from Verdun through her implant.

«What's your estimation of the Jeroboam pilot?» Verdun asked.

Mariposa frowned and stopped walking. Verdun was the head of the Earth Planetary Customs Service. As a high-level AI, Verdun was easily capable of directly overseeing the work of over one hundred thousand Customs Agents, but it rarely micromanaged.

«He seems nice enough,» Mariposa replied, «if a bit ignorant of how we run things around here. But I don't think he'll be a problem.»

«He's already a problem. His ship should have been red-flagged before it arrived. It shouldn't have even been allowed to dock.»

«I'm sorry. Nothing came up on—»

«Not your fault. Data integration problem with old records—I've fixed it. Did he seem hostile?»

«Hostile? No. What's this about?»

«That ship and its crew must be considered as possible enemy combatants. Protocol dictates that you arm yourself before any further interaction.»

«Enemy?» There hadn't been a war since before Mariposa's birth. «What enemy?»

«Jeroboam Colony has been at war with the United Worlds for the past 592 years. They broke off diplomatic ties in December 2407, and the UW assembly passed an embargo resolution six months later. Trade with Jeroboam is completely forbidden.»

The floatgun's countergrav generator whirred softly from its position above Mariposa's right shoulder as she walked into the room adjoining Cooper's quarantine cell. Verdun had told her she'd get used to it, but she hoped the situation would be resolved before that.

Cooper cocked his head when he saw her. "So, my blood pure enough I can get out of this box?" His eyes darted to the floatgun and his brow wrinkled.

Mariposa stopped two paces from the glass wall. "Shear-jashub Cooper, I regret to inform you that you are now a prisoner of war. In accordance with the Geneva Conventions, you will—"

"What?" Mouth open, Cooper squinted at her.

"The Geneva Conventions are the protocols regarding treatment of prisoners of war." Returning to the script Verdun had given her, Mariposa said, "You will be treated humanely until the war is over and you can be repatriated. I will send an explanation of your rights to your pad."

Cooper rubbed a hand over the back of his head. "You can't do this! I need to get those ashes down to Earth."

"Your ship and its contents have been seized. You and your ship will be turned over to military authorities when possible." Mariposa's voice softened as she said, "I'm sorry."

"Please, this has to be a mistake. We are a peaceful planet. We can't possibly have anything you want."

"Mr. Cooper, your planet declared war on the UW."

"Is this some sort of psychological test?" He shook his head. "The Elders wouldn't start a war while I was on this mission—and even if they did, with our tech level it would be like a flea declaring war on a comet."

«He's right, Verdun,» she sent through her implant. «It doesn't make sense.»

«The technological differential existed when they declared war. The decision was not rational on their part.»

She pressed her lips together for a moment, then spoke aloud. "This is silly. For the record, Mr. Cooper, do you know anything at all about a war your planet started six hundred years ago?"

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«This isn't the proper protocol.» Verdun's disapproval was almost tangible through Mariposa's implant.

"Six hundred years? We were barely a colo . . . Oh." Cooper's face turned red.

Mariposa arched an eyebrow.

"Look, you have to understand that the Founding Elders were persecuted on Earth for their religious beliefs. They wanted to leave Old Earth and its evils behind—that's why they found a planet so far away that there weren't any colonies within a hundred lights until fifty years ago. It's only since then that we've started having interstellar trade. My ship is the only FTL ship we have."

She nodded encouragement.

"So when the Founding Elders established Jeroboam, they sent a message back to Earth, called the Declaration of Holy Separation. Every child learns about it in school."

"What did it say?" Mariposa asked, even as she queried her implant for information on the document.

Cooper scratched the back of his neck. "Don't know as I can quote it word for word anymore, but . . . It begins: 'As you have cast us out from Earth into the heavens, so shall God cast you out from Heaven into the eternal fires of Hell.' There's a lot more, but the important thing is the end: 'And to maintain our holy separation, we declare war against all evil which might come against us, and we fear not, for God is the pillar of fire which shall consume the wicked.'"

As he spoke, Mariposa's implant retrieved a copy of the declaration, highlighting the relevant portions in her vision. "I see. So you really did declare war against the UW."

"But we never did anything about it," said Cooper. "The Founding Elders said God would fight our battle for us. And the fact that no United Worlds warships ever came was proof. My people don't think we're at war with you. They think we *won* the war, six hundred years ago."

«I think he's telling the truth,» she sent to the AI.

«So do I.» Then Verdun spoke through the com speakers so Cooper could hear. "Mr. Cooper, what protected your planet was your extreme isolation, not a deity. The hypercom message only took 203 days to reach Earth, but with the FTL drives of that period, any military expedition would have taken over forty years to make the round trip."

Cooper flashed a questioning look at Mariposa.

"That's Verdun. My boss."

Nodding, Cooper said, "I'm just trying to explain that there isn't a real war between my planet and the UW, so we can clear this mess up and let me carry on with my mission."

"Wait," said Mariposa. "These ashes you're carrying are the remains of those Founding Elders who declared a holy war against the UW?"

Cooper winced. "Not just them, but all the original colonists who were born on Earth."

"If they thought Earth is such an evil place, why are you bringing their ashes here?"

"Because God is a God of order," Cooper said. "'For dust thou art, and unto dust shalt thou return.'"

It sounded vaguely familiar, and her implant obliged by telling her it was a quote from the Bible. "I'm not sure I understand."

"I was born on Jeroboam," said Cooper. "I was created from the dust of that planet. But the founders of the colony were created of the dust of Earth, and they must be returned to Earth before the new millennium so they may be resurrected according to God's proper order."

"Resurrected?" Mariposa blinked. "You expect them to return to life when you take them back to Earth?"

Cooper waggled his right hand in what Mariposa assumed must be a local gesture on his planet. "Sort of. God will raise them from the dead to live with Him in Heaven."

Verdun's calm voice came from the speakers. "I'm sorry to tell you that will

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not happen."

Shrugging, Cooper said, "It's a matter of faith."

"No," said Verdun, "It's a matter of logic, assuming your religious beliefs are correct. The UW has embargoed Jeroboam, therefore your cargo cannot clear customs, therefore the remains of your ancestors cannot return to Earth, and therefore your ancestors will not be resurrected."

That evening, as Mariposa sat alone while waiting for the table's portal to deliver her Argentine chorizo sandwich, she thought about Cooper. He had looked discouraged when she left, assigned by Verdun to clear the paperwork for a diplomatic ship from Cumbria.

«We've got to do something about Cooper,» she sent to Verdun.

«I believe the situation is under control.»

«No, I mean we need to help him.» The table portal opened, and Mariposa withdrew the plate.

«We are trusted to protect the people of Earth as a whole. As a Customs Agent, you must not begin to identify with the traders.»

«I know that.» She bit into her sandwich, and the warm sausage fueled her annoyance. «You're far more intelligent than I am. So why can't you see how stupid this never fought, long forgotten war is? Isn't it in the best interest of the people of Earth to end it before someone decides to fight it for real?»

«The probability that Jeroboam could pose a conventional military threat to Earth is so close to zero as to be of no concern. However, the possibility of war by unconventional means cannot be ruled out. For example, the ashes Cooper claims to be carrying could contain a plague unknown to UW medical science. That is why the embargo was put into place, and why it must remain as long as the war continues.»

«And how long will that be?»

«I do not know. Until the diplomats say it is over.»

***

September 28, 2999 C.E.

"I don't know as I've ever been called a diplomat." Cooper's brow furrowed as he looked at Mariposa.

"You were chosen by your leaders, your Elders, to represent them here in returning the ashes of your founders, weren't you?"

A sad smile replaced Cooper's frown. "Chosen? I was *born* for this mission. My Christian name, Shear-jashub: it comes from the Bible. Means 'a remnant shall return.' Ever since I was a boy, my father taught me it would be my honor to return the remnant of our founders to the planet of their creation."

Mariposa blinked. For a moment, she wondered what life would have been like if her parents had expected her to become a butterfly in some way. "But your Elders entrusted this mission to you. And you're the only person from Jeroboam in the Sol System, so that makes you the closest thing to an ambassador your planet has, right?"

Raising his eyebrows, Cooper said, "You're trying to give me diplomatic immunity, so I can return home instead of sitting here as a POW?"

"More than that. If you're recognized as a diplomat, maybe you can negotiate an end to this stupid war!"

Cooper pinched at stubble on his chin. "That's a thought."

«Mariposa,» Verdun sent through her implant, «you are walking a thin line. I do not approve of this.»

«Do you disapprove?»

«If his intentions are hostile, you are giving him an opening to transport a potentially dangerous cargo to Earth.»

«I will inspect that ship and its cargo down to the last molecule. If there's any danger, I swear I will not let it through.»

Verdun did not reply through her implant. Instead, its voice came over the speaker. "Mr. Cooper, do you have any evidence that you have authority to negotiate on behalf of your world's government to end the state of war?"

Wincing, Cooper said, "The Elders never mentioned the war."

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"Then you are hardly in a position to end it," said Verdun.

Cooper snapped his fingers. "Wait, I think I have something. If you'll give me access to my ship's computer? I have a message from the First Elder."

«Letting him access his ship is a risk,» Verdun sent to Mariposa.

«I believe him when he says he knows nothing about the war.»

After a moment Verdun said, "I am inside your ship's systems now. Your network security measures are rather primitive. Where is the file?"

Cooper's eyes widened briefly. "You're an AI?"

"Of course," said Verdun.

"But you sound like a real person."

Mariposa chuckled. "I'm sure he means that as a compliment, Verdun." Focusing her attention on Cooper, she said, "High-level AIs like Verdun are so far beyond human that it takes only a small fraction of their capability to act like a 'person.' And since Verdun is the head of Earth Customs, you don't want to insult it again."

Cooper saluted her and said, "Yes, ma'am. No offense intended, Verdun. The file I need is tagged as a personal letter, dated around the time I left, which was March 31, 2997. The sender was Isaiah Cooper, First Elder of the True Church."

The screen inside the quarantine cell flickered and displayed the face of a gray-haired man. As he began to speak, his name registered and Mariposa saw the clear family resemblance between him and Cooper.

Cooper moved to the computer console at the desk. "If you'll give me access to forward to the right place?"

After a few moments of fiddling, Cooper resumed playback.

"A final word, my son," said the man on screen. "I know that in your travels you have not always held to the strictures of our faith. The temptations of the fallen have tested you, and you have been found wanting."

Glancing at Cooper, Mariposa saw his face redden.

Cooper's father continued, "But the spirits of the Founders cry out to us from Limbo. Do whatever you must to get their remains to Earth, and neither God nor the Church will count it amiss. Go now with my blessing."

Cooper stopped the recording. "I think that means I have authority to make peace, if necessary."

Mariposa nodded slowly. "It should be enough to at least get you a hearing. What do you think, Verdun?"

"I agree," said Verdun. Through Mariposa's link, it added, «I've been through all the data on that pitiful computer, and there is nothing to indicate his story is false or that he is a threat in any way.»

October 18, 2999 C.E.

"Your credentials have been provisionally approved, Mr. Ambassador." Mariposa smiled at Cooper as her implant transmitted the codes to unlock the quarantine cell. "Someone from the External Affairs Ministry is taking the next shuttle up from Quito and will be here in a few hours. In the meantime, I've been authorized to play tour guide."

Cooper got up from his chair. "I'd be happy to fly down instead."

She raised an eyebrow. "Patience, Mr. Ambassador. You have much to learn about diplomacy."

He bobbed his head. "Sorry."

"You should be," she said. "I almost thought you didn't want me as your tour guide. Not very diplomatic."

"I couldn't ask for a better guide," he said, flashing her a smile. "You've been helpful beyond the call of duty." He stepped out of the cell and took a deep breath. "Lead the way."

"The station was originally built as a beamed-energy power satellite that could double as a laser ablator for defense against asteroid impacts," said Mariposa as she took Cooper into Station 27's Hall of History. She pointed to a holopic of a light-sail probe. "That's Chiron I, the first probe sent to Alpha Centauri. Our central laser

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helped push it up to 7 percent of *c*."

Nodding, Cooper said, "Impressive."

Mariposa shrugged. "The Pearson-Chakrabarti drive was perfected after that, actually, so the FTL probes got there first."

"And what about this?" He pointed to a holopic of an oblong blob.

"That's the 'Hot Potato'—a small asteroid that was used to test the laser ablation technique. We shifted its orbit by using our laser to heat chunks of it so they'd blow off."

"Wow." Cooper raised his eyebrows. "You stopped it from hitting Earth?"

"No, it was just a test. It wasn't on a collision course." She felt suddenly embarrassed that she was bragging about historical details that had happened long before she had been assigned to Station 27—long before she was born, even.

"But still, I had no idea your station was here to help fend off asteroids. I thought it was just to fend off annoying foreigners."

"You're not annoying," said Mariposa. "But the laser's just used for research now—we don't do asteroid defense anymore. Any asteroid that gets close is merely captured by countergrav beams and lowered gently to Earth to be used for resources. In fact, we have ships out in the Belt sending asteroids toward Earth."

His brow winkled. "You don't worry that one'll get through?"

She blinked. The thought had never occurred to her. She queried her implant and was rapidly reassured. "There are multiple redundant systems in place. The AIs would never have allowed it otherwise."

After a moment, he nodded slowly. "You place a lot of faith in these AIs. Doesn't that worry you, to rely on soulless beings?"

"Soulless?" Deciding that it might offend him to mention that she didn't believe humans had souls, Mariposa said, "Have you found souled beings to be completely reliable?"

He laughed. "I guess not."

November 21, 2999 C.E.

As the molecular scanner began its final sweep of the cargo hold, Mariposa turned her attention again to the hand-painted urns that lined the walls. Each contained the ashes of one of Jeroboam's founding colonists and was decorated with a portrait of the deceased. Calligraphic letters spelled out the name, date of birth, and date of death.

One urn stood alone on a shelf: Jeroboam Cooper—Born July 16, 2352—Died April 27, 2466. The picture showed a smiling, wrinkled face surrounded by flowing white hair.

Cooper's ancestor, she surmised. He must have been the leader of the colony, if they named it after him. The painting made him seem different from the stern authoritarian she would have imagined.

The scanner beeped to signal it was done. Mariposa accessed the results through her implant. This was the third thorough scan she'd done, and it confirmed the other two. There were no unknown molecules on board. The contents of the urns matched the profile of cremated human remains. Every object on board had been identified, and the only objects that might be considered weapons were a magnesium flare gun in an emergency kit and the knives in the galley.

«All clear,» she sent to Verdun, along with the scanner's report.

«Your instincts regarding Shear-jashub Cooper were apparently correct. It is one of the paradoxes of AIs, that we may understand more than humans about everything except humans.»

Mariposa chuckled mentally. «Perhaps it's just that when we think we're right, we don't overanalyze things.»

«You underestimate the human capability for overanalysis. The UW Special Subcommittee for Jeroboam has just concluded its third week of hearings with unanimous agreement that further hearings should be held beginning December third. If this matter were being considered by a committee of AIs, we would have reached a consensus decision in seconds.»

Mariposa exited into the umbilical connecting Cooper's ship to Station 27. «But

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would it have been the *right* decision?» she asked as she replaced the quarantine seal on the ship's hatch.

«It would have been the right decision based on the available information. That is the best that anyone, human or AI, can do.»

December 24, 2999 C.E.

"Merry Christmas!" said Mariposa when Cooper answered the door to his temporary diplomatic quarters. She held out a small box wrapped in red plastic film. Her research had revealed that red was one of the traditional colors of the holiday.

Cooper took the box and stared at it. There were dark circles under his eyes—he must not be getting much sleep since the subcommittee adjourned the previous week, postponing any further action until January. "I'm sorry, I didn't get you anything. I didn't know you celebrated Christmas."

Mariposa waved away his concern. "I couldn't have accepted a gift anyway. It would look like an attempt at bribery."

He held up the box. "Nobody's concerned that you might be bribing me?"

Shrugging, Mariposa said, "Nothing in the regs about that. I'm not violating some Jeroboam law, am I?"

Cooper shook his head. "Come on in. I was just recording a letter to my family."

She followed him into the living room and sat down on the couch. He sat on a chair facing her.

"Open it," she said.

He complied, unwrapping the plastic to find a clear diamondglass box that appeared empty. He looked up at her with questioning eyes.

"It's a common tourist item, so I was hoping you hadn't bought one already," said Mariposa. "It's called 'A Breath of Earth.'"

"What is it?"

"Compressed air from Earth's atmosphere. I know you're disappointed at being stuck here on the station instead of going down to Earth. So I thought I'd bring a little bit of Earth to you."

Cooper smiled. "Thank you."

"Here's the best part: the reason the air is compressed is so they could fit 10^{22} molecules inside, while still making it small enough to fit in a pocket."

Rotating the box, Cooper frowned at it and said, "How much air is that?"

"Only about a liter, so it's not under extreme pressure. But there's a reason for that particular number. Not only is it about the average size of a human breath, but also, due to the mixing of the atmosphere over time, the odds are that box contains molecules breathed by just about everybody who ever lived on Earth. Even someone born three thousand years ago."

Cooper leaned forward and gently placed the box on the coffee table. "I will treasure it always."

They sat silently for a few moments, looking at the box.

"Technically, the new millennium doesn't start until January 1, 3001," said Mariposa, "so you really have a year left before your deadline."

Shaking his head, Cooper said, "That's not the way we count it."

"I'm sorry about the bureaucracy," said Mariposa.

"It's not your fault." Cooper sighed. "I'm the one who has failed my ancestors."

"No, you've done everything you could," said Mariposa. "It's their fault, not yours. They're the ones who declared war, not you."

He didn't answer.

"Surely God will not leave their spirits in . . ." Mariposa queried her implant as to what Cooper's father had said about the location of his ancestors. ". . . in Limbo forever, just because you miss the deadline by a few weeks or months."

"No, not forever," said Cooper. "Just until the next millennium. Just another thousand years."

December 31, 2999 C.E.

Mariposa was inspecting a racing yacht when Verdun interrupted her. «We have a security situation. Cooper's ship has forcibly undocked from the station.»

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The date made Cooper's plan obvious. «He's going to try to land his ship on Earth.»

«That was what I projected as his probable course of action.»

Mariposa let out a slow breath. «I'll try to talk him out of it.»

«Good. He is not responding to me, but human males tend to pay more attention to attractive females.»

«Flatterer.» Mariposa excused herself from the yacht owner and hurried to the nearest control cubicle so she could communicate with video. «What's PlanDef doing?»

«Nothing.»

«Why not?» Mariposa sat down in the cubicle, which recognized the authorization code from her implant and lit up its screens.

«Bringing this matter to the attention of my fellow AIs would involve a certain loss of face on my part. That is why I hope you can solve this quickly.»

As Mariposa tried to establish a communications link with Cooper, she directed the cubicle to show his ship and its projected course. A red curve showed the ship hitting atmosphere in approximately three minutes.

"Cooper? Can you hear me?" she said. "Talk to me."

There was no response for several seconds. Then Cooper's face appeared on screen. "Remember when you said I had done everything I could? I realized there was one thing left."

"Planetary Defense will not let you land. Turn around now, before they're forced to stop you."

"Just let me do what I've sworn to do, and you can arrest me, put me on trial, execute me—I don't care."

«Verdun,» Mariposa sent, «is there any way we could transfer custody to a customs facility on Earth, while maintaining quarantine?»

«If there were, I would have suggested such a plan when this problem first presented itself.»

"Please, Cooper. Just come back and eventually this will all get sorted out."

Cooper sighed. "Since we met, you have gone out of your way to help me. Why?"

Mariposa frowned. "I guess it's because I thought you needed help."

"And I've repaid your goodness with trouble." He sighed again. "So I'm sorry."

"I forgive you. Just come back." Mariposa watched the track of Cooper's ship as it moved steadily closer to Earth.

Verdun's voice broke in on the channel. "Unless you begin to change course away from Earth in the next thirty seconds, I will have no choice but to inform Planetary Defense that your ship is a possible threat."

"I don't want to hurt anyone," said Cooper. "Mariposa's searched it—she knows it's safe."

"That doesn't matter," said Verdun. "Your ship cannot land while the embargo remains in place."

From the screen, Cooper's eyes stared into hers. "Mariposa, you wouldn't really shoot me down, would you?"

She shook her head. "It's not up to me. Verdun's my boss, not the other way around."

Cooper shut his eyes and his lips moved silently.

Verdun said, "Now, Cooper. This is your last chance."

Cooper's eyes snapped open. "Changing course now."

Relief swept over Mariposa. She focused on the screen showing Cooper's projected course, but the red line curved more steeply toward Earth. "The other way, Cooper!"

"I'm, uh, experiencing a guidance system malfunction," said Cooper. "Mayday. Mayday. Request permission to make an emergency landing."

He was such a bad liar that she almost laughed in spite of the situation. But it might work. «Verdun, a ship emergency gives a legal pretext for Cooper to land.»

«I already notified PlanDef when he refused to change course away from Earth. They agree Cooper is a possible threat. It's

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out of my jurisdiction now.»

«I swear I went over that entire ship, and there aren't any weapons—»

«If he were to crash into a populated area, there could be thousands of casualties. PlanDef is powering up the countergrav beams.»

"Cooper," said Mariposa, "it's not going to work. PlanDef considers you a threat."

"I'm unarmed."

"Your ship itself is a weapon." Mariposa leaned toward the vidcam. "They're powering up the countergrav beams they use for asteroid defense. Turn away so they'll know you're not a threat."

On her screen, Cooper's ship reached the end of the red curve, and the view zoomed and created another red line to show the ship's projected path through the atmosphere. A yellow circle showed the probable zone of impact, somewhere in the Pacific Ocean. After a moment she realized it was just to the west of the International Date Line—where the new millennium would begin in just under fifteen minutes.

«He's not headed for a populated area,» she sent to Verdun.

«We know. But he might change course and hit somewhere in the Americas.»

The view from Cooper's ship began vibrating. Cooper reached out and made a slight adjustment to the autopilot's course.

"Nice thick atmo you've got," said Cooper. "On Jeroboam, the air's a lot thinner."

"Slow down, Cooper. Don't go in ballistic like a weapon."

"I want to land before they can stop me." He grinned.

Mariposa raised her hands up by her face, then dropped them to her lap. "Don't you get it? There is no way you can land. The countergravs will stop you. They can stop asteroids—they won't even need full power against you."

"At minimum power," said Verdun, "your ship will not only be stopped, it will be pushed away at approximately thirty-five gees."

The energy seemed to drain from Cooper's face. "No, you can't let them do that. I need to be here when the millennium starts."

"Once the magnets are spinning fast enough, the beam will be focused on you," said Verdun. "You have less than three minutes. If your religion has some predeath ritual, I suggest you engage in it now."

"Too soon," Cooper whispered. "I timed it wrong."

Mariposa blinked back tears. She didn't know what to say to a man about to die. She had tried to save him, but there was nothing she could do for him now.

"Mariposa?" He reached into his pocket and pulled out the gift she had given him. "I want to thank you for this little piece of Earth."

"You're welcome."

"And thanks for showing me around your station and that big laser. If I had been a threat, would you have used that laser to destroy me and my ship?"

"But you're not . . ."

"Imagine I was. Please."

Something in his eyes told her he was pleading with her to help him. And suddenly she knew what he wanted.

She nodded.

He smiled his thanks.

Through her implant, she accessed the controls for the station's laser. Under her control, the targeting mirrors swiveled. The laser began drawing power from the station's superconducting capacitors.

«What are you doing that for?» asked Verdun.

An invisible pulse of light reached out to Cooper's ship. One hundred meters in diameter, the beam effortlessly breached the particle shielding and hit its target with thirty-seven terajoules of energy. The titanium alloy hull of the freighter did not melt—it simply vaporized. In a fraction of a second, the ship and all its contents, including Cooper, were atomized.

Mariposa shut down the laser without firing a second pulse.

«Why did you do that? PlanDef had things under control.»

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She shook her head. «My responsibility. I swore if there was any danger, I would not let it through.»

«I'm relieving you until this matter is investigated.»

«Fine.»

She sat in the cubicle and watched as the glowing cloud of particles that had been a ship dissipated into the darkness just before midnight.

Remembering some phrases used at the funeral of one of her great-grandfathers, she whispered, "Dust to dust. Ashes to ashes."

August 22, 3002 C.E.

Verdun had granted Mariposa's request for extended leave from the Customs Service. It took twenty-six months and three different ships to make her way to Jeroboam. Cooper's father, the First Elder, had been surprised by her request for a meeting, but he had agreed.

"My son mentioned you," he said as he showed her into his office. "We didn't get his letters until after he was already dead, of course. He said you were very helpful, so I thank you." He motioned her toward a chair and then sat behind a large desk made of what looked like real wood.

"So you know he is dead," Mariposa said. She was glad not to have to break that news.

"Yes. The UW diplomatic corps let us know." He smiled. "They've been trying to get us to sign a peace treaty. I guess that will be my son's legacy, even if he failed at his true mission."

Mariposa shook her head. "But he didn't fail. That's why I came. To explain."

The First Elder's brow furrowed. "But they told me his ship was destroyed before he could land on Earth."

Mariposa pulled her pad out of her purse and set it to replay her final conversation with Cooper.

When it was finished, the First Elder leaned back in his chair. "And then his ship was destroyed."

"Yes. By me, using the laser." Mariposa held her breath, hoping that the First Elder would interpret Cooper's message the same way she had.

He jerked his head forward and stared at her. She met his eyes.

"So the laser destroyed his ship beffore it was ejected from Earth's atmosphere?" he asked.

"Yes."

After a long moment, the First Elder sighed. "That's what Shear-jashub wanted from you. Thank you."

She wasn't sure what to say to a man who had just thanked her for killing his son. So she just looked down at the floor. At least she had her answer.

"I will let the people know that Shear-jashub fulfilled the measure of his creation. However, I will not mention your role in the matter—some people might not be as understanding as I."

"That's fine," she said.

"Is there anything else you wanted to tell me?"

She shook her head. "But I did bring you something." She reached into her purse.

In the center of the city of Jeroboam can be found the Holy Cemetery, where only the most righteous are buried. In the very center of the cemetery is a mausoleum that used to contain the ashes of the founders of the colony.

Even though the original occupants have been returned to the planet of their birth, the mausoleum is not empty. In the very center, the place of highest honor, stands a marble pedestal. The stone is engraved: Shear-jashub Cooper—Born April 3, 2961—Died December 31, 2999.

Atop the pedestal, sealed in diamond-glass to await the next resurrection of those born on Jeroboam, is a vial of blood. ■

And how can man die better
Than facing fearful odds,
For the ashes of his fathers
And the temples of his gods. . . .
—from "Horatius"
by Thomas Babington Macaulay

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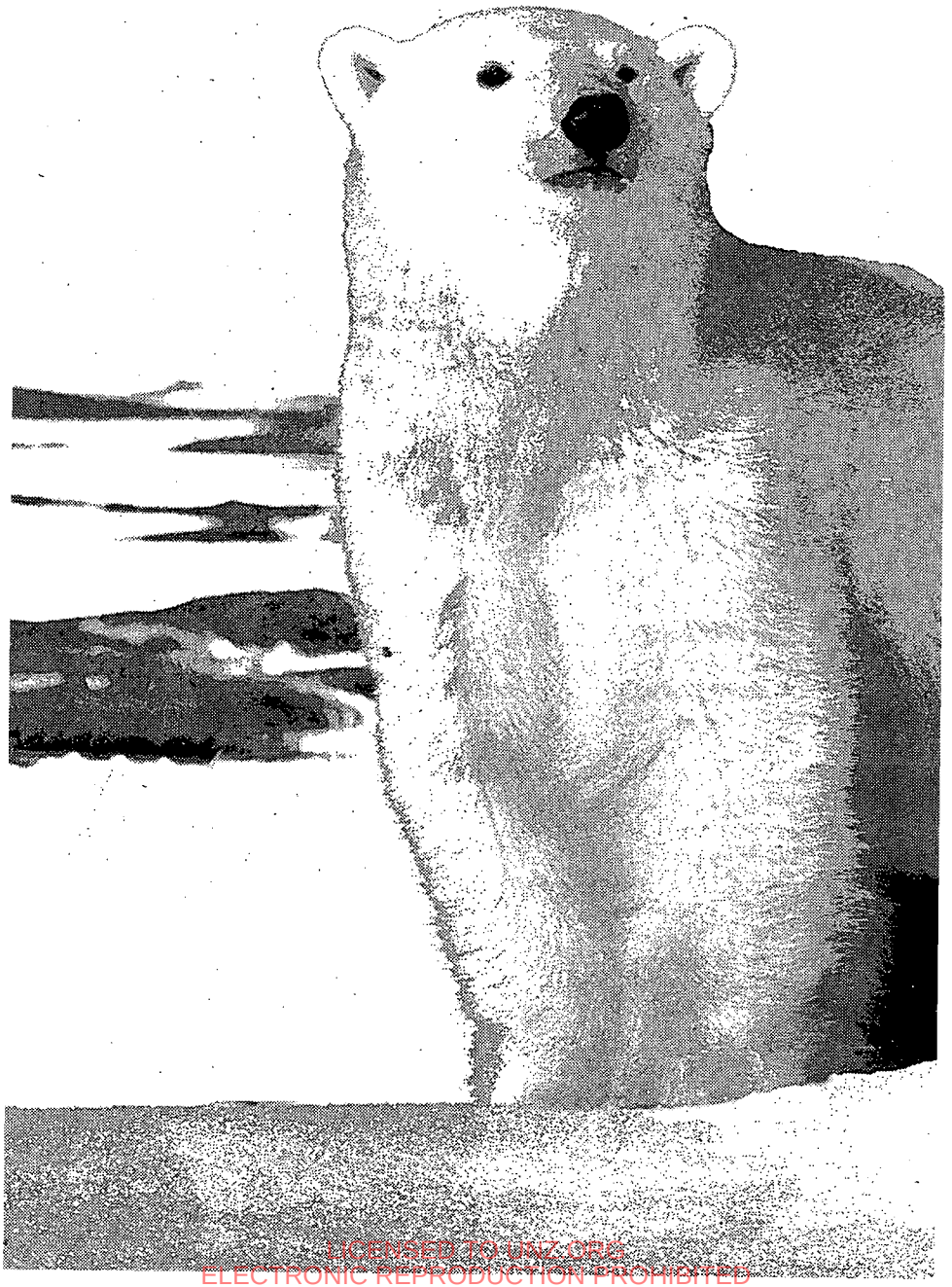
Still-Hunting

Sarah K. Castle



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Somewhere north of Noatak, Rariil caught a whiff of a woman. The smell, dilute in the breeze off the Chukchi Sea, was familiar. He licked the air, tasting for details. It was Graashah. She'd been here recently, and without cubs. Rariil grinned. As tradition demanded, she'd come home from Dheznaya to find a mate. She couldn't have walked. The ice across the Bering Strait had thawed early. She must have taken a ship. They now allowed bears on ships, polars and Kodiaks alike, with a special class of ticket. His lips curled back over his canines. He wondered what the terms of those tickets were.

Graashah had been Rariil's first mate, back when the ice pack lasted through the mating season. He'd been a smaller bear then, but well fed and determined enough to impress her. Rariil was now the biggest polar bear around. He'd secretly perfected a method for still-hunting seals in open water, so he was fat on seal blubber despite the warm winter. Graashah would surely choose him, if he could get to her first. A fishing boat was moored a couple of hundred yards offshore. If Graashah could take a boat, so could he. A polar bear could set his own terms on a boat that size.

He swam out and climbed on board. The boatmen weren't too happy about it. Those on deck ran to the bow and fired first a flare gun and then a shotgun. They shot up in the air and into the sea, anywhere except toward Rariil. They all knew shooting a polar bear was prohibited by law.

"Wevok." Rariil growled the name of his communal meeting ground. "Wevok, now!"

The men lowered their guns and looked at each other.

"Aw, shit," one said.

"No! Point Hope! We're going to Point Hope," another man yelled at Rariil.

"Wevok," Rariil said and sat down heavily. The whole boat rocked. Rariil would talk to men when it was necessary, but there was rarely a reason to listen to them.

Finally, they motored up the coast with Rariil grooming himself calmly on the rear deck. His thoughts returned to Graashah and whom he'd have to fight to win her love. He believed he could beat any polar bear who'd spent the season trying to hunt on ice, but the damn Kodiaks could be a problem. Every year they came farther north. Dirty polar sows, who didn't mind fishy breath, would mate with them. The brown buggers could fight and match a polar bear off the ice. Rariil chuffed. Graashah wasn't that kind of bear. She wouldn't come all the way back here to take up with a Kodiak. Rariil licked the rough, translucent fur on his forearms until its brilliant white compared favorably to the clean paint on the boat.

When he dove off at Wevok the boat bobbed like a cork, throwing a man into the water with him. The man should have known the law against bears eating men, but he looked pretty panicked anyway when Rariil helped him back on board. The boat turned a tight arc, its motor grumbling, and then it sped back towards Point Hope. The best thing about men was that they'd always leave, eventually.

He smelled Graashah strongly now. Her musk mingled with the rotten sweetness of aged carrion. For more than an hour, he stalked her along the gravelly beach. He found her near a beluga carcass at the water's edge. The faint diesel smell told Rariil a boat had pushed it to shore. It was a handout, probably from the Food For Bears program. Men had started the program a couple years after the permanent ice receded so far from shore most polar bears couldn't swim to it in the summer. He'd seen them bringing dead seals in once. Seals! A polar bear who couldn't catch their own seals traditionally went to wait for death on the ice. To make it worse, the seals stank of human pride, tinged with guilt. Rariil wouldn't eat that

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blubber, not even after dark.

Ten feasting bears had crushed through the ice on the ground around the whale. They were all covered in mud and blood. Rariil was disgusted with the filthy beggars. They probably hadn't even done the Successful Scavenger prayer, and why would they? The bears hadn't found the thing. It had been brought to them.

Rariil stood on his hind legs and roared to announce himself. Graashah raised her head from the beluga and barked a greeting. The sight of her made his heart beat deeper. He sized up the competition. He was ready to fight and win her. The one Kodiak in the crowd recognized him and grudgingly moved off a short distance. Rariil growled; it was moving upwind. The young polars around the carcass smelled Rariil's indignation. They turned to watch the Kodiak's progress toward the dominant position.

It kept its head high and submissive. Maybe the damn thing didn't know it was being rude. Rariil roared and galloped a short distance toward it. The Kodiak watched him over its shoulder. Either wisely or through lucky chance, it moved inland and away from the upwind position. From where he stood, Rariil saw a strange shape on its head. At its crown, a smooth surface shaped like a half moon covered its ears. The Kodiak's eyes flashed from the shadow cast by the bent disc on its head, very handy for a bear not used to sunlight glaring on snow.

Rariil had never seen a Kodiak like this. He walked closer, until he could see what the thing was. It was a red plastic saucer, the kind human children slid down hills on. A cord hooked on each handle bent the saucer down over the Kodiak's ears and pulled tight under his chin. The Kodiak had not only come this far north, he'd brought human garbage with him. Rariil charged in silent fury.

The Kodiak ran, but slid and stumbled in the soft snow. Rariil caught it when it was down. It rolled to its back immediately. Rariil went for the saucer. He yanked the rim with his teeth. It didn't come right off, so he yanked again.

"My hat!" the Kodiak squealed.

The elastic cord whipped loose and smacked Rariil in the eye. He jumped aside to rub the stinging eye in the snow. The Kodiak rolled up and ran off. His eye soothed, Rariil tore the saucer to shreds with teeth and claws. Kodiaks in hats . . . what would be next? He scattered the pieces to dilute the combined garbage and Kodiak stench, growling furiously as he did it. The worst thing about Kodiaks was that they always came back.

Back at the beluga, two nanulaks nibbled at the whale's gut. Their yellow fur was evidence that Kodiaks had found mates here before. Rariil growled as he passed them. Nanulaks would not fight for a female and had no interest in mating. When Rariil dreamed about his death, he often found the spirit world crowded with nanulak ghosts. They wandered the ice with their black-ringed eyes looking huge on their malformed faces. They gaped with desire to return to the living world and howled with the knowledge that they never could. They were sterile, all of them. Nanulaks gave Rariil a bad feeling, but it wasn't one he could fight. They ate but didn't mate. It just seemed wrong. He went to the shore and washed his paws in the ice-clotted water.

Graashah approached him and dropped a large piece of blubber at his feet. It quivered in the low surf.

"Greetings, Rariil, father of three cubs by my womb," she said, in the language spoken only by polar bears.

"Greetings, Graashah," he replied. Her direct approach embarrassed him, but the blubber smell took it off his mind. Rariil drooled thickly but kept his head low to broadcast dominance. He watched the male polar bears at the carcass behind her. Three of them stared back.

Graashah slowly wagged her head in a

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playful gesture. "Eat the blubber, Rariil. You don't need to fight. I chose you the moment I saw you. There isn't a polar male as fat as you on either side of the Bering Strait. You'll sire my cubs this season."

"Why do you insult me? I'll fight for my mate as we've done since ice has floated on the sea."

Keeping her head low, she said, "Eat my offering, Rariil."

She pushed the blubber closer to his forepaw. It was a choice piece, and he was hungry. The largest polar male stepped forward. Its challenge suffused the air.

"A sea bear doesn't relax before mating, we fight. I don't like the way those youngsters are looking at me. It's traditional, and I'll be damned if I don't like to rough up a couple boys this time of year." Rariil began a lumbering charge toward the bears gathered around the carcass. The young polars stood their ground, bracing themselves against his charge. They smelled hopeful, which raised Rariil's rage to a fighting level.

Graashah ran to block him and then charged with her head low. Rariil stumbled to a stop. A female bear didn't behave this way unless she had cubs.

"I don't have time for this! I need to mate before the moon passes through another quarter."

She'd spoken the word *time* in English. There was no such term in the language native to polar bears.

"Time?" Rariil repeated, straining to recall its meaning.

Graashah smelled his confusion and explained. "The men have made a den for me in Anchorage. If you want to fight, you can fight my man, but I need to mate soon."

"Your man?" Rariil was baffled.

"Over there." She pointed with her snout.

Far off in the distance, Rariil could barely make out the shape of a human. Behind him sat a big spinney stick bug, the kind men fly around in. Sniffing at the air, Rariil picked out the acrid ash smell of burnt jet fuel from the other smells of rot. The bug must have been there for a while; the smell was faint.

He barked a laugh, "A man?"

Graashah's head stilled and she hissed, "Yes, a man. He was a watcher in Siberia. He would bring plump seals just for me. I taught him to speak polar bear. He made a stone that speaks properly, scents and all. We talk for hours. He wants me to come live with him in Anchorage. His name is Grrary."

Rariil smelled Graashah's affection for the man as she spoke. "A polar bear can't live in Anchorage except as a captive," he reminded her.

"He says he can make snow for me all year long, and I'll live in a large den where the floors are always ice."

"You would live in a zoo."

"We won't be in a zoo. Every fall, we'll travel back to Dheznaya. The cubs and I will roam free on the ice while Grrary works. In the summer, we'll stay in Anchorage. I'll work with the men to set up a preserve for polar bears, no Kodiaks allowed. Every breeding polar female will get a free ride to the preserve, in season.

"Grrary says I'll be an ambassador, the first ambassador to humans from land mammals. Sperm whales, dolphins, and now polar bears: the bears of the sea. It's perfect that we're next. I talked to an orca about it and she was envious. Diplomatic recognition is a great honor."

"Did you offer the orca your hind leg while you were at it?" Rariil remembered Graashah had always been a jokester.

"She wasn't hungry," she said without apparent irony.

Rariil scratched behind his ear with a rear paw. She had to be joking. He picked up the blubber and chewed it thoughtfully. It was delicious, just far enough past fresh to be savory.

"Let's go see this man of yours, then." Rariil raised himself up on all fours and

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stretched. He laughed to clear the doubts from his mind. When Graashah smelled the sweet spice of his credulity, they began to walk toward the man.

"Why do you trust this Grrary?"

"He's learned our language and customs, shown respect. Besides, he's fragile as a newborn cub, no fur, no blubber. Those puffy clothes he wears make him smell like a goose. He's harmless."

Rariil remembered the naked humans he'd seen and smelled at seaside sweat lodges. "I think they smell like piss."

"Grrary smells very nice. Too nice, sometimes he makes me hungry. But all I have to do then is open my eyes. There isn't enough fat on him to make a meal."

The depth and detail of Graashah's fantasy disturbed him. He decided to change the subject.

"So, how are the bear-class accommodations on a ship?"

"I've heard it's miserable. They put you below deck, and you don't get any fresh air from the time you board to the time you disembark. Wait for the ice and walk across the Strait. That's what I'd do. Why do you ask?"

"Well, you recently came across yourself didn't you?"

"No! Grrary flew me here in his spinney stick bug yesterday. Not many men have a bug like that, you know."

Rariil sniffed hard at Graashah's fur and smelled burnt fuel there, faintly. He looked toward the spinney stick bug, now maybe twenty paces away. A man stood at its door. Rariil's hackles rose at this strangeness. Traditionally, men crawled back in their metal bugs as soon as they saw you take even a few steps in their direction. Law or no law, bears will be bears, and a human looks tasty when you're hungry.

The man slowly dropped to his hands and knees in the shallow snow as they approached. This seemed so wrong, Rariil reared up on his hind legs and roared. The man and Graashah both cringed, lowering their heads and bodies toward the ground.

Rariil roared in polar bear, "Whatever in Ursus' name is going on here better come to an end!" Then, in English, he shouted, "Stop this. Now!"

The man trembled in his blue, puffy bodysuit. He wagged his whole body from the hips as he crawled forward two, then three steps before collapsing to the ground. His rear end lowered onto his heels. His forehead lowered to the snow. He stretched his arms towards Rariil. The man turned his right hand over, and then opened it to expose a small angular stone. He rubbed the stone with his thumb in a vigorous circular motion.

"Greetings, Rariil, honorable mate of Graashah. My name is Gary. I meekly greet you and ask that you share your food, if you have any to spare." The stone in the man's hand spoke in choppy but understandable polar bear. The sour scent of submission was perfect.

Rariil dropped to all fours in disbelief. He understood the words, but they didn't make any sense. Graashah must have taught him the traditional greeting for a submissive bear begging food from a dominant one. He didn't know how to respond, and it made him angry. *Now we'll have to listen, and they'll know we understand,* he thought. *These pale-skinned men always step directly upwind.*

"He's too small to fight," said Graashah, sniffing to understand the cause of Rariil's confusion. "Let's go. I need to mate."

Rariil smelled her heat rising. His body tensed. Bears were always upwind of men when it came to size and respect for tradition. A polar bear fights for mating privileges. The begging was offensive, no matter the language used to offer it.

Grrary remained prostrate in the wet snow, all puffed up with fake blubber. "I'm here to respect . . ."

Rariil snorted, lowered his head, and charged.

Graashah roared, "Grrary!" and ran at

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Rariil.

Grrary's stone must have smelled Rariil's aggression. He was already up, pulling a tranquilizer gun from between his knees. The dart stung Rariil's chest seconds before Graashah tackled him. She held him down, and he fell deeply asleep.

Rariil woke up on ice, knowing he'd fought Grrary and lost. By tradition he should now be looking for another mate, but Graashah was nearby. They were alone as far as he could smell. There was only one thing to do. He followed her footprints from where they began, next to the stick bug rails' impressions in the snow.

Graashah was still-hunting when he found her. Chin at the edge of a seal's breathing hole, she lay on the ice as if asleep. Rariil waited at a distance until a seal popped up. Graashah bit its head, pulled it onto the ice, and killed it with a hard shake. She noticed him when she started to eat and growled a warning. Rariil stayed back. She'd need the blubber for her pregnancy.

They mated, wandered, and hunted together for days. The sun arced across the sky ten times before they got to the edge of the ice. Graashah would leave for her den soon. Rariil wondered if she would walk or if Grrary would pick her up.

"Will our cubs beg for food, or will you teach them hunt?" he barked when he saw how she watched the sky.

"They'll live on the preserve full time after they're weaned. Bears like you will teach them the traditional ways as they get older on the ice."

Rariil grunted. "Men always step directly upwind. They'll insist on driving around your preserve in their rolling metal bugs, making noise and flashing lights, careless of the wind. Their petroleum and piss stench will drive traditional bears away. You can't keep your dignity in a situation like that."

Graashah growled. Rariil smelled her impatience. "The frozen part of the world is shrinking. We need to work with men if we want to remain as we are: beautiful white bears living on and from the sea. I'll feed my cubs through their weaning whether the blubber is given by Grrary or hunted by me. Seals won't swim into our paws. We need ice to hunt."

"Let me show you something." Rariil pushed himself into the sea, chest first.

Graashah paddled after him into the open water. When they got a little more than halfway to shore, Rariil said, "Spread your arms and float. Be as still as you can. Clear your mind. Smell like ice." His back and rump gleamed white against the dark green water. Though the water was calm, it took some effort to keep his nose above the surface. The rich saltwater smell filled his nostrils, and he imagined himself frozen, distilled from the sea.

The sun moved a short way across the sky before a pod of seals swam past. Their slick, dark heads broke the surface here and there. Rariil made no move to follow them; tradition held it better to wait quietly. He was tempted by the thought that two strong kicks would bring them into reach. But seals were snagged by their curiosity or their need to rest and breathe.

Soon the seals came back. They swam around him, just out of reach, long enough to try his patience and his strength. He concentrated, tried to tangle them in his thoughts, willing them into his reach. Finally, one swam to Rariil's arm and touched it with a fin, testing it as a place to haul out and rest. Rariil quickly folded the seal to his chest and bit its head, killing it in the traditional way. He rolled and tore into the seal, holding it steady with his paws over his stomach.

"The seals need ice to rest. We can be that ice. Teach the cubs." Rariil tossed the half-eaten seal to Graashah. She floated nearby, nodding. The sea smell overpowered her scent, so Rariil couldn't tell what she was thinking.

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They began the long swim back. It took more out of a bear to float still than it did to lie on the ice. Fatigued, he searched the horizon for the white line that meant rest. He heard the spinney stick bug long before he saw it. Graashah stopped swimming and floated, waiting for her man. Rariil swam past her, still heading for shore.

He heard the bug stop to hover over Graashah. He rolled to his back, hoping for a short rest and curious about how Grrary would pick Graashah up from the sea. Grrary leaned from the bug's open door, aiming a large gun that rested on his shoulder. He pointed it a Graashah. It fired with a loud pop.

Rariil saw a net fly from the muzzle and land in the water. Graashah swam into it and carefully pushed her arms through two of the net's holes. Slowly, she was lifted out of the water toward Grrary. Rariil stared in disbelief. Surely they both knew it was illegal to trap a polar bear. Graashah relaxed into the net. The scent of her relief blew past him on the wind pushed by the bug's rotors. It couldn't be a trap if it was consensual. Rariil rolled back over to resume his swim.

The wind from the rotors suddenly began beating on his back. The water whipped into a choppy froth, making it more difficult to swim. Rariil roared his frustration and then choked when his mouth filled with water. The net hit the water in front of him. He turned to swim away, felt the angle of the rotor wind change, and his back legs snagged in the net being pulled up behind him. Rariil rolled to tear at the net with his claws, but his arm got tangled. A gentle pull wrapped the net around him and pulled him out of the water.

Rariil struggled and the net swung wide arcs, pulling the bug from side to side. He was on his back staring up at the bug and the sky beyond it.

"I am trapped!" he roared in polar bear. "You take me against my will!" He thrashed again, and the bug tilted toward the water.

"If you don't quit struggling, the copter will crash and we'll all drown. Let us take you to the ice. You won't make it on your own." Grrary's speaking stone sounded from the bug, unnaturally loud.

Rariil twisted around to see the ice still far away on the horizon. What the man said made sense. His energy drained away with his adrenaline, and he brayed his resignation. The man might not understand, but Graashah would.

They laid him gently on the ice and remotely unclipped their line from the net before flying away. Rariil lay still for a while, feeling the net press into his back. He'd almost swum into his nanulak nightmare. An open water still-hunt could kill if it took too long or didn't bring in enough blubber to fuel the swim back.

The frozen part of the world was shrinking. It was now necessary to listen to men, and there was a reason to speak to them. The terms of a polar preserve would need to be negotiated. Kodiaks would leave them alone if the distance across the ice was great enough. Polars on the preserve shouldn't have to compete for blubber and space against nanulaks, who could never bear or sire cubs.

Rariil rolled over and stood up. The net draped over his back, hanging on him like a parka on an Inupiat. He shrugged. The net slid easily off his arms and legs to pile around his feet. Offended by its human smells, he tore at it with his longest claw, cutting it in half. He paused, remembering how it so gently entangled him. A net this small could be easily shrugged off and held the water. He could use it to snag seals from an arm's length away, or bring in two seals at once. Rariil grinned. An open water still-hunt could make a bear fat, if the conditions were right. This was something to teach the cubs. Rariil kept his tongue in his mouth. It would take a while to get used to the smells. ■

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The Dinosaurs of Eden

Darrell Schweitzer

There really were dinosaurs in the Garden of Eden, exactly as the Creation Museum in Petersburg, Kentucky would have us believe. *Tyrannosaurus rex* coexisted with lions. *Diplodocus* grazed alongside sheep. Duckbills delved in the swamps (for Eden had its moister parts to accommodate such creatures) alongside actual ducks. All creatures great and small had come into being in the space of less than a week by acts of special creation, and they dwelt together happily in the Peaceable Kingdom, doing no violence to one another, although this caused some malnutrition among the T. rexes and Allosaurs because their long, daggerlike teeth were not really suitable for chewing grass.

But there was harmony in the Garden, more or less, largely because the T. rex had a brain the size of a walnut and lacked the imagination to desire anything more.

The problem was Man, or more precisely, Man and Woman, for male and female were they created, and they tended to get on each other's nerves. The Man talked too much. He berated the T-rex for having a brain the size of a walnut and for lack of imagination. The Woman, overhearing all this, took it as a veiled criticism of herself.

It was the Woman who first ate of the Tree of the Knowledge of Good and Evil, which had been expressly forbidden by the Creator. (Later attempts to blame this on temptation by the Serpent have proven hard to verify, due to a lack of reliable witnesses.)

"So," she said to the Man, "if you're so smart, why don't you have a bite too?"

"I think I will!" he replied, and he took from her the apple, and he did eat.

The Tyrannosaurus stood by, gaping stupidly.

"What are you staring at?" said the Man. "You've got a brain the size of a

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walnut. Here, try this. Maybe it'll make your brain grow a little."

He tossed the remains of the forbidden fruit into the T. rex's gaping maw, and T. rex swallowed reflexively.

All sorts of new knowledge flooded the minds of the Man and the Woman. They knew good and evil. They saw their nakedness and sought fig leaves. They understood that E equals MC squared.

The T. rex however, having begun with a brain the size of a walnut, understood considerably less, but it *did* figure out what its long, sharp teeth were actually suited for, and it ate, and kept on eating, devouring first the Man and the Woman, then several other dinosaurs, and all the mammals save those so small they went skittering around its ankles; and when the Creator walked in the Garden and saw the results of the carnage (of which the T. rex was entirely unashamed, being too stupid to work out the finer philosophical implications), the only possible solution was to drive all the dinosaurs out of Eden and set an angel with a flaming sword to stand watch to make sure none of them got back in. (Dinosaurs may not be very bright, but they are impressed by flaming swords.)

The Creator watched them go, knowing that they would rule the Earth for millions of years, rending the flesh of their fellows until the eventual extinction of all. Then He looked down upon the sorry remnants of the order *Mammalia* skittering around his ankles and said, "I think I'll try evolution next time." □

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THE FALLING DOMINOES: THE SOURCE OF ULTRA-HIGH-ENERGY COSMIC RAYS

Back in 1999, as the millennium was approaching, I wrote an AV column entitled "What We Don't Understand," listing what I then considered to be the top seven major end-of-century unsolved problems in physics and astrophysics. Here is my 1999 list of problems: (1) vacuum energy and dark matter in cosmology; (2) the arbitrary parameters of the Standard Model of particle physics; (3) the origin of gamma ray bursts; (4) the origin of ultra-high-energy cosmic rays; (5) the solar neutrino problem; (6) the origin of matter/antimatter asymmetry in the universe; and (7) the origin of the arrow of time. That list was published about seven years ago, and in the intervening time, some of these unsolved problems have been falling like dominoes. In this column I want to describe our latest gain in understanding.

The first falling domino was item five, the solar neutrino problem. It involved the discrepancy between the intensity of neutrinos from nuclear fusion in the Sun as predicted by our best astrophysics models and as measured with large underground neutrino detectors (which was about three times smaller). The SNO experiment in Sudbury, Canada solved this problem by measuring both the charged current and the neutral current interactions of solar neutrinos. This provided compelling evidence that neutrinos have a small mass (a few thousandths of an electron volt). Because neutrinos have mass, on their way from the Sun to the Earth about two thirds of the solar neutrinos "oscillate" from easy to detect electron neutrinos to hard to detect mu and tau neutrinos. The solar neutrino puzzle is resolved, but as is usual in science, its resolution raises new questions. (See my AV column in the July/August 2004 issue of *Analog*.)

The next domino to fall was item three on my list, the origin of gamma ray bursts. Gamma ray bursts (GRB) were accidentally discovered in 1969 by the VELA military satellites. They were built to look for clandestine nuclear explosions, but instead they detected huge bursts of gamma radiation that occurred a few times per day and came from outside the solar system. The origin of these events, which became a major scientific mystery of twentieth century astrophysics, has now been identified. NASA's Swift satellite, launched in November 2004 for the explicit purpose of investing GRB, included a gamma ray detector to identify and locate the burst and to point onboard X-ray and optical telescopes in the burst direction in un-

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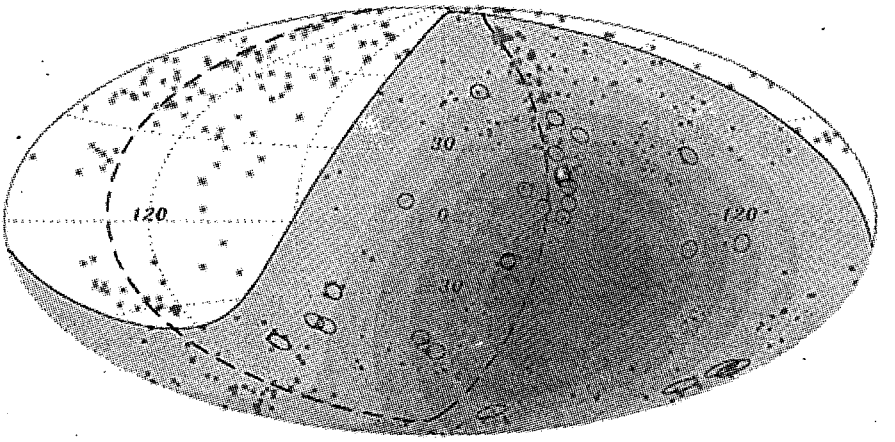

der a minute. Swift was able to observe the X-ray and optical components of such events even before the gamma ray emission had stopped. Distant galaxies were observed to "light up" in the visible and X-ray regions as they emitted these huge bursts of gamma radiation.

The conclusions are that the GRB sources are billions of light years away and that the majority of the long-duration GRB are probably the result of the core collapse of a rapidly rotating, high mass star into a black hole. Shorter duration GRB are believed to be caused by the "merging" of two neutron stars that spin down and collide. The details of gamma ray production are still a mystery however, because the observations do not fit well with theoretical models.

Now problem four on my list, the origin of ultra-high-energy cosmic rays, has joined the group of falling dominoes. The Pierre Auger Collaboration announced last month in a paper published in the November 8, 2007 issue of *Science* that the source of these highest energy particles has been identified.

Let me start by providing some background about cosmic rays. The most energetic particles observed come not from large particle accelerators, but from the cosmos itself. These particles from space, usually protons, have energies up to 10 billion times higher than the most energetic protons we can produce with particle accelerators. One super-energetic particle (probably a single proton) recorded at the Fly's Eye detector in Utah was estimated to have an energy of about $3x10^{20}$ electron volts (or 300 EeV). This is a huge amount of energy, which corresponds to 50 joules or the kinetic energy of a baseball thrown at 60 mph.

In the past few years, the Pierre Auger Collaboration, an international consortium of universities and scientific institutions partly funded by the U.S. National Science Foundation and Department of Energy, has been building the Auger Observatory, an array of 1,600 large particle detectors spaced 1.5 kilometers apart and occupying 3,000 square kilometers of the Argentine pampas. The detector system is designed to record "extended air showers," the large-area cascades of many thousands of particles created at ground level by a single ultra-energetic particle interacting with the upper atmosphere. In the past few years as it has come into operation, the Auger Observatory has recorded the arrival of 77 ultra-high-energy cosmic rays with energies in excess of $4.0x10^{19}$ electron volts (40 EeV), including 27 particles

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with energies in excess of 5.7×10^{19} electron volts (57 EeV).

The observation of such ultra-high-energy (UHE) particles creates a problem. They should not be able to reach us unless they come from fairly nearby. The universe is permeated with cosmic microwave background radiation, low energy photons released about 500,000 years after the Big Bang, when the protons and electrons paired off and matter and light went their separate ways. Protons with energies above about five EeV, on colliding with these photons, should produce pi-mesons and should rapidly lose energy. This process, called the GZK cutoff, should result in a sharp drop in cosmic rays above five EeV. (See my column "Ultra-Energetic Cosmic Rays and Gamma Ray Bursts" in the January 1996 *Analog*.) This "cutoff" is not observed in the data, and more cosmic rays are observed above this energy than extrapolation from lower energies would predict. The only plausible resolution of this paradox is the assumption that these UHE particles are being produced relatively close to the Earth, within around 200 million light years.

The universe is permeated with magnetic fields, and these fields bend the paths of cosmic ray charged particles at low energies. This deflection prevents backtracking these particles to see where they came from. However, as the cosmic ray particle energy goes up, the deflection goes down. The result is that when cosmic rays reach the 40 EeV level they can be backtracked to an accuracy of a few degrees, providing information on possible sources.

One possible source of energetic cosmic rays is an "active galactic nucleus" (AGN), the small fraction of known galaxies with a compact region at the center that has a high luminosity over some or all of the electromagnetic spectrum (in the radio, infrared, optical, ultraviolet, X-ray, and gamma ray wavelengths). An AGN is believed to be a result of a super-massive black hole at the galactic center that is devouring large quantities of matter and converting some fraction of it to the energetic emission of particles and radiation. Our Milky Way galaxy is believed to have a black hole at its center with a mass three million times that of our Sun, but it is not an AGN, probably because its intake of matter is not large. There is some evidence that AGNs result from the collision of two galaxies. The massive disruption that follows allows prodigious quantities of matter to be swallowed by the black holes at the two galactic cores, leading to vast amounts of gravitational energy release and radiation. It is plausible that such an environment could produce ultra-high-energy cosmic rays.

Therefore, with the GZK cutoff in mind, the Pierre Auger Collaboration compared the sky coordinates of their 27 most energetic cosmic ray events (all with energies greater than 57 EeV) with the positions of known AGN that are within about 240 million light years (or 75 megaparsecs) from Earth.

The correspondence between events and AGN locations is remarkable. Almost all of the cosmic ray locations have an AGN site nearby. Centaurus A (also known as NGC 5128), a lenticular galaxy about 14 million light-years away in the constellation Centaurus, is the location of one of the closest AGNs to the Earth. The Auger study shows two ultra-high-energy cosmic ray events within a few degrees of this object.

This study provides strong evidence that the highest energy cosmic rays are coming from AGNs. But as usual, this discovery brings with it more questions. There is no known mechanism by which any known physical process, with or without a black hole involved, could accelerate particles to such high energies. So the question is, is there new physics involved in the actions of ultra-massive black holes? Or is there simply some subtle process involving the physics of very strong gravitational

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fields that no one has yet though of? Watch the column for further developments. ■

AV Columns Online: Electronic reprints of about 140 "The Alternate View" columns by John G. Cramer, previously published in *Analog*, are available online at: http://www.npl.washington.edu/av.

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UHE Cosmic Rays

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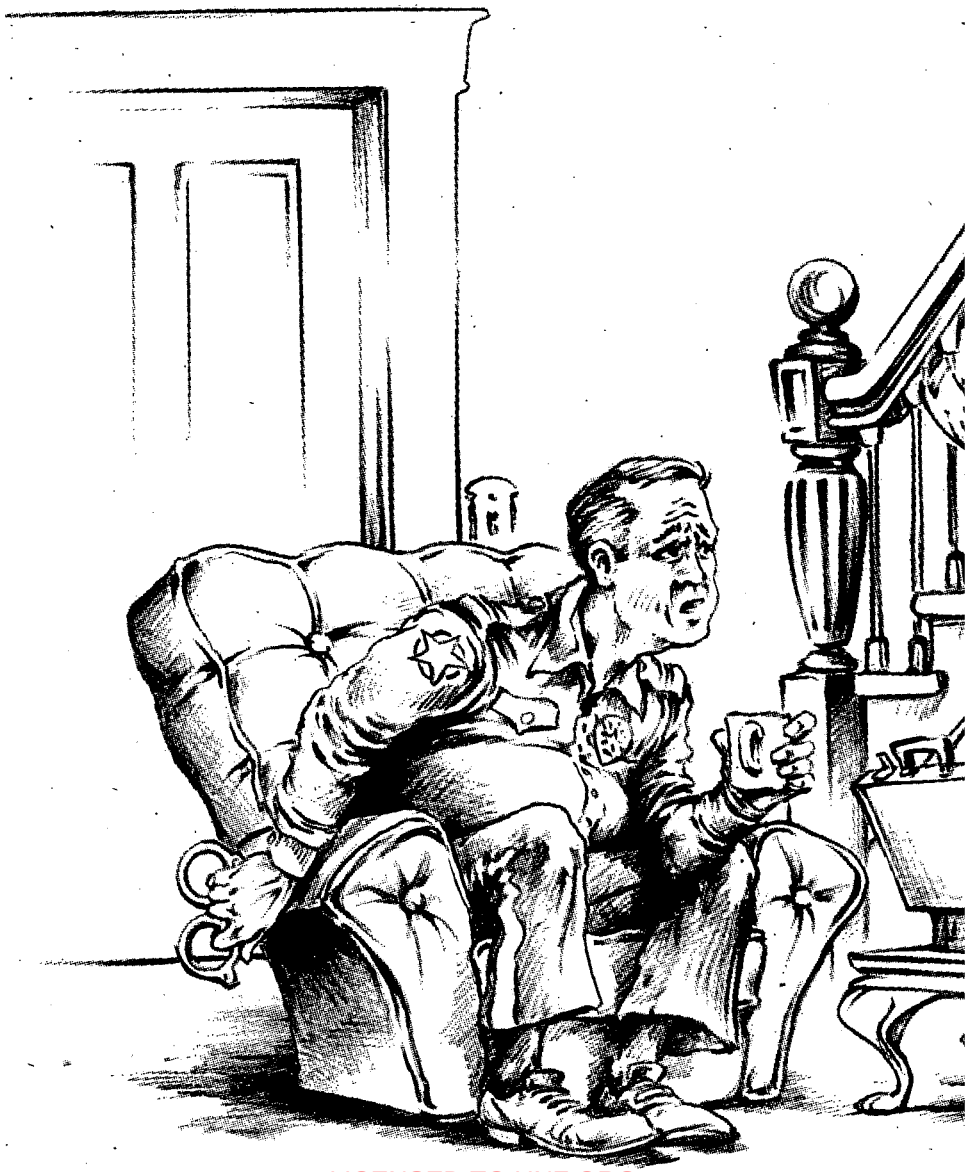
Petite Pilferer Puzzles Piedmont Police

Walter L. Kleine



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"Car One, Dispatch. Location?" Ellen's voice crackled on the radio.

I thumbed the mike. "Lake, between Howard and Greenbank."

"Report of Grandma Malone chasing the Petite Pilferer with a baseball bat. Kingston and Greenbank, toward Rose."

Sandi hit the siren and the gas. Tires squalled. *"This* time we get the little bitch!"

We didn't—as usual.

We caught up with Effie "Flying Grandma" Malone near the Oakland border. She was leaning against the pole of a "This is a Neighborhood Watch Community" sign, panting, dripping sweat, shorts and singlet plastered to her skin, a kid-size aluminum softball bat in her hand.

No Petite Pilferer in sight.

Sandi stopped long enough for me to bail out of the cruiser, and she headed for a parking space. In polite Piedmont you don't double-park *anything,* not even a police cruiser, if you can help it.

Grandma Malone is eighty, about five one, dyes her hair black (at eighty, it has to be dyed, doesn't it?), runs five miles a day and ten on Sunday, and does the 10k so close to the U.S. age group record that she may break it one of these days.

I trundled between a Mercedes and a Volvo (I'm six six and two-eighty; with a heart that barely passes my police physical, I don't run, I trundle) and said, "Are you all right, Mrs. Malone?" I worry that someday we're going to find she's had a coronary on one of the hills.

"Of course I'm fine," she said. "I'm just not much of a sprinter anymore, is all. She got away, damn her thieving hide! Ran behind that bush and vanished!" She pointed at a somewhat sickly former live Christmas tree that was trying valiantly to survive after being replanted in the Han's front yard.

Sandi charged up, heard the last few words, saw the direction of the pointing finger, said, "Relax, Grams, I've got her," and took off like an F-15 with afterburners blazing.

Mrs. Han hurried out. "It was *her,* all right," she declared, handing Grandma Malone a glass of water and a towel. "Same woman I caught in *my* house! I looked out the front window and saw her with a silver candlestick in each hand and Grams chasing her. I grabbed Ted's .38, but she was gone, like into thin air, so I got Grams some water."

"Dispatch, Unit One," I said into my portable.

"Dispatch."

"Greenbank near Rose; confirm Petite Pilferer. Unit Two in pursuit on foot, north on Greenbank."

"Cars Three and Four, you read?"

"Roger, Dispatch. Be there in five."

"Slow it down," Sandi's voice crackled on her portable. "We've got same old, same old. Not a trace. Kids in the yard at Greenbank and Rose didn't see a thing."

In two hours of investigation, all we learned was that the Petite Pilferer had endurance but wasn't real fast. The only difference from the other sightings was that Effie Malone damn near caught the woman.

Effie had been a commercial artist before she retired. We went back to her house and she did a couple of quick sketches of the Petite Pilferer. She said she'd do watercolors so the skin would look right and get them to us ASAP.

That was the best clue we've had since we got the first report, three months ago, that someone came home and found a small woman in their house, apparently lost or mentally confused. The woman muttered something in a heavy accent about making a mistake, she was in the wrong house, please excuse her, and left. People who pursued her discovered she wasn't in sight. Most of them found things missing, usually a few small items. Sometimes, like Effie Malone's candlesticks, the items were antique and valuable. Other times, the thefts made no sense—things like a set of Tupperware bowls and a pair of beat-up Barbie and Ken dolls. None of the loot turned up in pawnshops.

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Descriptions agreed on size (between four nine and five feet, very thin), hair (waist length, black), possible age (late twenties to early thirties), and skin color (olive to honey brown). Almost every nationality between lily white and African black was guessed—Mexican, Lebanese, Arab, Israeli, Native American, Japanese, Thai, Portuguese, and on and on. She hit only in Piedmont, never in Oakland's equally upscale Montclair district, the Berkeley hills, or other places that would—rationally—seem like good pickings for a thief.

The *Montclarion,* which covers Piedmont as well as Montclair, headlined a story, "Petite Pilferer Puzzles Piedmont Police," and the name stuck. We appealed to residents to lock their doors and windows, but Piedmont is such an upscale and low-crime community that we might as well have talked to the wind.

The department didn't exactly become a laughing stock, but sometimes it seemed we were the only ones who took the woman seriously. We checked the national computer net and every law enforcement agency and mental institution in the state. We appealed to private therapists to seek institutional help for any patient who fit the description—and advise us about it, if patient confidentiality permitted.

Result? Nothing, zip, zilch, nada.

We determined that this time she took nothing but the candlesticks. Effie told us she came in the back door after a run, found the woman in her living room with a candlestick in each hand, grabbed her grandson's bat, and went for her. The woman ran. Effie never quite got within bopping range, to her immense frustration.

"These will help a lot," Sandi told her, accepting the sketches. "We'll get them in the paper and on TV. We'll put copies in the window of every business in town. Somebody will recognize her."

I had my doubts, but kept my mouth shut. Sandi's twenty-four, just a few years out of college and the police academy, with worlds of confidence in modern police science. I'm twice her age—four years in the Air Force learning to be a cop and twenty years with Oakland PD before I semiretired and went to work for Piedmont, where the lack of excitement is better for my borderline heart. I've developed that instinct for strange cases you get when you've been on enough of them. You can't explain it to anyone who hasn't been around long enough.

This smelled like a case that would go on for a while and stop, leaving everyone mystified. I couldn't get too excited, less for the sake of my heart than because no violence was involved. Effie's candlesticks might be worth a few hundred bucks, plus sentimental value. They'd been a wedding present to her grandmother. I felt bad about that, but she left her back door unlocked so she wouldn't have to carry a key while running. Couldn't say she hadn't been warned, and a cop can't be everywhere at once.

I suggested, as diplomatically as possible, that in the future she should lock her door and carry a key.

Never one to be outdone in the good advice department—she's an experienced grandma, after all—she said that if I wanted to live to be her age I should watch my diet, lose some weight, and take up running.

Sandi and I made it back to the station in time for shift change. I was in the middle of briefing the night shift when Ellen, the dispatcher, raced into the squad room.

"Sarge," she said breathlessly, "we just got a call from Dr. Evans Van Dyke. He says his wife's earrings, necklace, and Tupperware bowls have returned."

"Have *what?*" I asked. Well, okay, so I bellowed. A sergeant has to act like one every so often, even in polite Piedmont. The Van Dykes were the first to report an appearance of the Petite Pilferer.

Ellen said, shaking her head in disbelief, "He says he came home and found them on the dining room table with five hun-

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dred-dollar bills and a note apologizing for the inconvenience."

Half the day and night shifts of Piedmont PD descended on the Van Dyke residence—or it must have seemed like that to them.

On the way over, I theorized that Mrs. Van Dyke had misplaced the items, found them, and was trying to cover her embarrassment.

Sandi laughed. "That might explain a lot."

There sat the jewelry, the Tupperware bowls, the note, and the money.

The note, handwritten in the beautiful back-slanted script of a left-hander who worked for hours on penmanship in third grade, wiped out my theory. Both Van Dykes are doctors, and right-handed.

The note said, "Please accept this token of appreciation for the loan of your goods. I hope it is adequate recompense for any inconvenience. These items have been invaluable in my research." It was signed, "Mrjriirh Tciryq, Ph.D."

"What the hell kind of name is that?" asked Sandi, echoed by everyone who could see the words.

"Sure ain't Polish," I said.

"Sergeant Przbylski," said Evans Van Dyke, "we changed every lock and installed an alarm after the burglary. Everything was locked. The alarm didn't go off. We called Brinks and checked. How do you explain . . . *this?*"

"I don't," I said, "until we've made our investigation."

After our investigation, I still couldn't explain it. The alarm worked. No sign of forced entry. We dusted for fingerprints, searched the house—the whole nine yards. Nothing. We got plenty of prints. I was willing to bet they'd either be the Van Dykes' or on file nowhere. We took everything to the lab for examination, over the protests of Mrs. Van Dyke, who wanted her jewels for the opera gala.

"I need a drink," said Sandi as we left.

"Me too. And a steak."

"Fish would be better for you, Sarge," she said, staring at my belly. "Hey, how was the physical? How's the heart? Doc say anything about exercise?"

I said, looking forward to my vacation, which started tomorrow, "It's fish for the next four weeks, provided they bite, Skinny Girl." I can call her that and laugh when we're off duty. "Doc Adams said everything was 'as good as could be expected,' whatever that means."

"Means you should listen to Grams."

We went to the Celestial and chewed over the case while we waited for something more substantial to chew on. I wondered, aloud, what southpaw the Van Dykes knew and trusted enough to write that note. Sandi decided to talk to Brinks, because the alarm hasn't been made that someone can't get around. If the Petite Pilferer could pick the locks without leaving a trace, the alarm should be no problem for her.

"I'll have her locked up when you get back from vacation, Sarge," she said.

"I'll bet you a dinner you don't," I said. "You place too much faith in science and not enough on hunch. When you're as old as I am . . ."

"You got a bet."

". . . you'll know that you should expect more calls like the Van Dykes. The woman's a crazy, probably harmless, possibly obsessive-compulsive . . ."

"Hey, Sarge, psychobabble is *my* specialty. You said so yourself. But you could be right. Now all we have to do is stake out everybody she hit and wait for her to return the crime to the scene."

I drove down the hill to the home on Woolsey Street, on the south edge of Berkeley, almost in Oakland, that Myra and I bought when we got married, filled with the glow of a fine steak, a glass of good red wine, and the warmth of a pleasant evening with a friend. Sandi and I mesh a lot like I used to mesh with Myra. Wish I was twenty years younger or she was twenty years older. She's engaged to a detective in Berkeley. I hope the guy

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knows how lucky he is.

Thinking of that makes me remember the great years Myra and I had together, before a drunk in an SUV ran a red light at sixty in a twenty mph zone and broadsided her, driver's side. Even a tough old former cruiser isn't enough protection when you're hit at that speed. Her car wasn't quite reduced to shrapnel, but might as well have been.

Myra turned me on to the rich world of art and antiques, which I'd never thought about much until I met her. I treasure the wonderful old furniture and paintings we selected together to grace our home. I know she'd want me to find someone to share my life . . . but I never have . . . so the art and antiques . . . the house . . . and the memories . . . are all I have.

I parked behind Harry Szumski's old faded yellow Volkswagen bus with an equally faded "Beam Me Up, Scotty, There's No Intelligent Life Down Here" bumper sticker.

Forget the Enterprise, *Scotty; just beam me to the lake. Four weeks of fishing when I feel like it and lying in the sun when I don't. Ahhh!*

I went up the front steps, opened the door—and walked into an empty living room.

Empty, that is, except for the Petite Pilferer, who stood in the kitchen doorway wearing a tweed suit, carrying a briefcase.

What the hell has she done with Myra's antiques and paintings?

I said, "Hello, Dr. Mrjriirh Tciryq. Won't you sit down?"

"Thank you, Stan. You pronounce my name better than most," she said, in an accent worse than a Frenchman murdering Polish. "Thank you, Stan," came out like "Hsnag giiu, Chyan." In twenty years with Oakland PD, learning to decipher most of the accents of the world, I've heard nothing close. She spoke as if she had to stop and think about each word.

She smiled, and the room wasn't empty.

My stereo and TV looked as odd as ever in the middle of Myra's beloved antiques. Everything was exactly as it had been when I left in haste this morning, even to the half-finished mug of coffee on the marble-topped table by the door. Not so much as a dust ball out of place.

The coffee was still steaming.

Ever have the feeling you're walking on quicksand, in the dark?

She strolled across the room, put down her briefcase, and perched on the Victorian loveseat opposite my favorite chair. Right where Myra used to sit.

I tried to figure the odds that I could walk over casually and put cuffs on her. Normally, there wouldn't have been any question, but I didn't want her to vanish into thin air again, not right before my eyes. I decided to try for information first.

I picked up the coffee and eased myself into the big recliner Myra had waiting for me when I came home from the hospital after getting shot up in a drug bust eighteen years ago. It's worn to conform to my body like no other chair in the world. I sipped the coffee. Fresh-brewed, not day-old warmed up. Fresher than the cup I left behind.

Mr. Spock, is this logical?

I said, conversationally, "Dr. Tciryq, I'd like to ask you a few questions about certain items taken from homes in Piedmont."

"Oh dear," she said, long, perfect fingers twisting in her lap, "were they missed?"

Her face, too, was perfection; each side an exact match for the other, exotic in the sort of way that could have a few dozen ethnic origins. In twenty-nine years of police work, twenty-nine years of studying faces, I've never seen a face with one side *exactly* like the other.

"Why, yes," I said, "some items were valuable, some had deep sentimental value, and some were used every day."

"Everything will be returned."

"Like the Van Dykes'?"

"The Van Dykes?" For a second, her face went blank; complete confusion. Every other word had been smooth, calculated, rehearsed, and—except for the

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accent—perfect.

"The jewelry and Tupperware bowls."

"Oh!" Sudden understanding. "The money . . . it was not enough?"

"I don't understand the money."

"A gift. Appreciation for use of the items."

"Use? But you were surprised that the items were missed. Why a gift, if you thought people didn't know you took the items?"

"Ah . . . a courtesy. It seemed reasonable. The items have been valuable in my research."

"I see." I stroked my chin, wishing there was some way to hit the speed dial for Dispatch on my cell phone without her seeing it or hearing Dispatch answer. "How did you get into the Van Dykes' house?"

"Through the door." She was back to rehearsed-perfect.

"The door was locked. There was an alarm. We found no evidence the lock was forced. The alarm wasn't tripped."

She cocked her head, as if puzzled. "Alarm? The door was open, so I walked in."

"I see. Why did you come here?"

She put her briefcase on the coffee table and opened it. "I wish to return these, but I am afraid to go back to the house. That woman tried to kill me." She put an envelope and Effie Malone's candlesticks on the table.

I said, "Mrs. Malone only wanted her candlesticks back. What kind of research do you do?"

"I am involved in antiquities and cultural objects." She closed the briefcase and stood. "I must be going, Stan. Thank you for your help and hospitality." She moved toward the door.

Time to stop talking and make the bust.

Or try to.

I put down my coffee, stood, put one hand on her shoulder, and snapped cuffs on her. She didn't seem to know what was happening and walked right into me. "Please sit down, Doctor." I took the briefcase from her hand and exerted gentle pressure on her shoulder. She half stumbled and sat down with a plop, as if she'd lost her balance.

She held up her hands and stared at the cuffs.

In twenty-nine years of arresting people, I have never seen an expression of such pure, absolute, stark terror on any face, and I've seen some damn scared people.

I said, calmly, "It's all right, Doctor. No one will hurt you." I kept a hand on her shoulder and hoped it was reassuring.

With my free hand I hit the speed dial on my cell phone. "Dispatch, I have the Petite Pilferer."

"No," she said. *"No!* You must not! I must go. *Now!"* She tried to stand up. I increased pressure on her shoulder.

"We must go to the station," I said soothingly. "We want to ask you a few more questions." Dispatch hadn't responded. I repeated, "Dispatch, Unit One."

"No! Please! Take them off!" She was straining at the cuffs, as if it was possible to break them.

Still no response from Dispatch. Sometimes cell phones don't work well inside buildings. Never had a problem calling from here before. "Stay there," I said. "Don't get up." I backed across the room to the regular phone, picked it up without taking my eyes off her, and punched speed dial for Dispatch by feel.

No dial tone. Somehow, I wasn't surprised. "What have you done to my phone?" I asked.

"I have not touched it." She bolted. Stood up, grabbed her briefcase with both hands, and ran into the kitchen, with me a step behind.

There's no way out of the kitchen except through a window I painted shut years ago and the back door, which has a key-locked deadbolt.

She wasn't there.

The window was still painted shut. The door was still locked.

Somehow, that didn't surprise me. I stared at the ceiling. "Beam me up, Scot-

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ty?" I whispered. I didn't believe any such thing. But it would explain a lot.

I went back to the living room.

The candlesticks and envelope remained. And her shoes, kicked off under the coffee table.

No, I wasn't imagining this.

I pressed speed dial again. "Dispatch, Unit One."

"Dispatch." Loud and clear.

"In pursuit of the Petite Pilferer on foot, my address. Brown tweed suit, barefoot, wearing my cuffs, carrying a briefcase. Out my door and vanished." I wasn't about to tell *anybody* she'd vanished from my locked kitchen, much less about the absence and sudden reappearance of my living room furnishings. I trundled out the door and down the street, just fast enough to make it look good.

Of course we didn't find her. Just tied up two of our crews and one each from Berkeley and Oakland for half the night.

At least Effie Malone would get her candlesticks back—after the lab was done checking them.

I slept late. Didn't matter when I got to the lake. Did matter that I got a good night's sleep.

When I went to the kitchen to make my morning coffee, my handcuffs were on the counter by the coffeepot; the cuffs I bought when I went to work for Oakland, fresh out of the Air Force, and carried all these years.

But they weren't mine.

Every scratch, ding, worn spot, and discoloration was faithfully reproduced; the same smooth action when closed or opened, and the same positive turn of the same key in the locks.

I knew it the minute I picked them up. Nothing visible; nothing I could point to and say, "There it is." They just weren't the same.

I thought about it while I ate breakfast, finished last-minute packing, and loaded my old ex-cruiser. I started to call the station to suggest that anything the Petite Pilferer returned should be checked for authenticity.

No.

Damned if I knew what good it would do if everything else came back like my cuffs. Nobody'd believe it, anyway. I compromised by dropping off the cuffs for lab analysis on my way out of town.

I promised myself I was not going to think about the Petite Pilferer for the next month and hope she'd been caught or had stopped operating by the time I got home.

My promise lasted a week.

I rowed back to shore near sundown and found my vacation neighbors, Bob and Silvie Marsh, waiting on the beach with the woman who'd rented their cabin for the rest of the summer.

The woman was one of *them.* Don't ask me how I knew, looking at a shadow outlined by last rays of the sun. Twenty-nine years of learning to listen to hunches, I suppose. She was *not* another Petite Pilferer.

"Stan," said Silvie, "this is Ania Kirakashian. She's an art historian. She's opening a shop in Oakland this fall."

I shook her hand. "Glad to know you, Ania. I've got more fish than I can eat. Join me?" Stan and Sylvie shared my catch most evenings. Tonight, they were departing for San Francisco.

"Sylvie says you catch the best fish in the lake," said Ania. "I'll clean them, if you like." Her voice was low and rich, her accent vaguely Middle Eastern; probably Beirut. Her face was as perfect as Dr. Mrjriirh Tciryq's, except for a nasty scar over her left eye. A glorious crown of gray-streaked black hair cascaded halfway down her back. About five six, slender but muscular, relaxed.

I said, "I'd always rather catch 'em and eat 'em than clean 'em."

Over dinner, the first of many pleasant evenings, Ania explained that she was as much anthropologist as historian. She was interested in the place of art, in the broadest sense, in the everyday life of cultures. "But," she said, "it's getting rough out

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there. I'm tired of being shot at and thrown in strange jails, so I'm taking over Grandpa's shop—as much as he'll let go of, anyway. I'll do a little guest lecturing at Cal, or any other university that's interested."

She made it sound plausible.

When I came in the next evening, Ania was sunbathing on my beach in a very European bikini, just slightly darker than her tanned, olive skin. She hadn't been making idle conversation when she said she was tired of being shot at. The scar over her eye had companions.

I pulled up my shirt to show my souvenirs of that drug bust. "Looks like we match," I said.

She laughed and asked how I got mine. I told the tale over another pleasant dinner, which became another pleasant evening.

I'd never felt so good in my life; so full of energy that I found myself doing things I hadn't done in twenty years, without a thought for my slightly marginal heart. A couple of mornings later, for no reason I could think of, I stepped on the bathroom scale. Normally, I never use a scale between one doctor's visit and the next. The scale had been Myra's, so I never threw it out. It said I weighed two-forty-five.

In Doc Adams' office, not two weeks ago, I'd been two eighty. Antique scale; maybe not accurate?

I drove into town to see Doctor Ellis, a young woman who'd taken over the practice of old Doc Harris. No horse-and-buggy country doctor she; all business and the latest equipment. Two forty-three and a quarter, on a gleaming white scale with a digital readout.

Somehow, I wasn't surprised when she said, "You've got the heart of a twenty-year-old. Are you a runner?"

I tried to conceal my shock by saying, "No, just a cop."

I drove back to the lake thinking about walking into an empty apartment, the instant reappearance of my furnishings, the phones that didn't work, and the Petite Pilferer vanishing from my kitchen.

I wondered if I was really *me*.

At the cabin, I looked in the mirror, half expecting to see a face identical on each side.

Same old reassuringly ugly mug.

I didn't push Ania or fish for information. I might get more if I acted as if everything was perfectly normal and let her do her thing. I had almost three weeks.

"I've never figured myself out," she said, one night. "I need to get away from everything and be alone, just me by myself, but I need people too." Her eyes flicked over the paintings Myra and I bought for our cabin. "Never thought I'd find a kindred spirit in a Piedmont cop. But . . ." A long pause. "I suppose a lot of what I do is detective work . . . of a sort. Find the pieces, put them together, decide what they mean, if they mean anything . . ."

I felt the closeness too. It was strange and didn't seem to have anything to do with who she was or why she might be here.

Ania told stories of things she'd done, places she'd been, people she knew—things that could be checked out. She'd attended American University and had a doctorate from Cal. My Beirut guess was half right, but way too simplified. She had a Lebanese-American father and a Palestinian refugee mother. The "Grandpa" she referred to, whose antiques shop she might take over, was Lebanese by birth. His family fled the Armenian genocide of 1915 and found temporary refuge there, until it became possible to come to the U.S. Mahomet Kirakashian was among the most respected dealers in the Bay Area, if not the nation. Myra and I had visited him often. We didn't buy a lot. Most of his stuff was too expensive, but every now and then we found bargains, or he advised us where to go to find something similar that we could afford. I still dropped in every now and then, mostly to admire his collection . . . but, as had been true while Myra lived, every so often I saw some-

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thing that spoke to me and bought it, hoping that Myra, wherever her soul went, would know and appreciate it. He's a true gentleman, of the old Middle Eastern school.

Ania listened to my cop stories with as much fascination as I listened to her tale of how she got her scars. She'd been caught between Shining Path guerrillas and government troops in Peru. Shining Path won that battle, picked her up, decided she was a friend, and nursed her back to health. When she returned to civilization, the government charged her with being Shining Path. The embassies couldn't get her out of jail, so she managed her own escape, taking half a dozen Shining Path with her. The Path smuggled her across half of South America and got her safely on a plane, with forged papers.

Indiana Jones, take a back seat; the lady got there first.

Two weeks passed. She neither said nor did anything to confirm what I knew every time I looked at her face. I found myself enjoying her company and getting closer in spite of myself. I decided it was time to poke a little bit.

We were sitting on my patio under a clear and star-filled sky. "Ania, did you ever meet a Dr. Mrjriirh Tciryq? A specialist in antiquities."

"Her?" A slight rise of inflection told me I'd hit the right button. "Once. In Kabul, just after the Russians left. Why?"

"What does she look like?"

"Four ten, ninety pounds, black hair to the waist, brown eyes, narrow face, full lips. She's doing her thing in Piedmont?" There was just the tiniest bit too little surprise in her voice.

"Yeah. Is she reputable?"

Ania laughed, the kind of hoot you hear in a squad room when detectives get talking about con artists they've known and caught. *"Reputable?* Hoo! If her 'Doctor' is real, I'll eat my bikini and walk to town naked. A vulture. A ruin-sacker. A culture-looter of the worst kind. Last I heard, about ten, twelve years ago, the Taliban had her. Wouldn't wish that on any woman, but can't say I was as sorry as I should have been. Tell me about it."

There was just the faintest trace of command in her voice. I told her the whole Petite Pilferer story, right down to the return of the not-mine handcuffs and my strange weight loss and return to health. "Do you know whether she has any Mysterious Eastern abilities to vanish from locked rooms?"

Ania let out her breath in a long sigh. "She got away from the Taliban. That's about the same thing. Candlesticks, jewelry, and Tupperware? That figures, but *returning* stuff? Not her style, not at all! Something scared her. Maybe Grandpa. She wouldn't have hit if she knew he was around. Everything she returned is probably a copy, like your handcuffs. Your living room stuff is probably original. She didn't have time to make copies. Hm. She's small. Did you look in places you might not think a person could get into? Under the sink? In cupboards? She can get into spaces you wouldn't think a child could fit. *I've* hidden in places you wouldn't think an eighty-pounder could squeeze into, and I'm one twenty. When your cuffs came back, were they locked or unlocked?"

"Unlocked. I didn't look in the cupboards. She didn't have time."

"You'd be surprised how fast you can hide when someone three times your size is chasing you. After you were asleep, she could get your keys and free herself. Do you have any theories?"

I raised a hand to the stars. "Beam me up, Scotty," I said softly.

Brief silence. "Beam me up? Oh, *Star Trek*. I've only seen one of the movies. They saved the whales. That was a long time ago. Do you believe in UFOs, Stan?"

"Never met an alien I didn't like."

She shared my laugh.

"UFOs?" I said, "No. Not even a little. Not logical, Mr. Spock. Somebody so advanced that they can go between stars can look at us all they want, any way they want, without making funny lights in the

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sky. Hell, Ania, *we* can count cars in a parking lot from a satellite. If they wanted to let us know they were here, I can think of better ways, and I presume they're smarter than I am."

She laughed softly. "I poke around old ruins and study living cultures which are . . . according to us . . . 'less advanced' than our own. If we could travel to other stars, I'd be doing the same thing."

"And there'd be the Mrjriirh Tciryqs of those stars, messing things up, one step ahead of the cops, wouldn't there?"

The squad room laugh. "You'd better believe!"

I said, reflectively, "I can imagine there'd be considerable research and academic value in the cultural artifacts of a world like this . . . and in living here to study the way we live. Hell, if someone invented time travel, wouldn't every archaeologist in town want to go back to live in ancient Greece, Egypt, China, or somewhere, never mind chasing down the reality behind the Bible, looking over Moses' shoulder when he discovered the Ten Commandments, and such? If people who can travel the stars wanted to do their version of such research, they could come in, pick up anything they wanted to examine, replace it with something that seemed identical, and, if they were responsible, return the original when they were done. They wouldn't steal the stuff and replace it a while later with a copy. But . . . there would be those, like the art and antiquities thieves of this world and those who buy from them, who'd feel there was value in the originals, and how could those primitives tell the difference, anyway, so why would it matter? I expect the outside folks have cops chasing the Tciryq's of their worlds."

Her soft chuckle told me all I needed to know. I'd guessed right. She said, as if this was an ordinary conversation, "Want another beer, Stan?"

"Sure."

"Back in a minute." She went inside. I heard the bathroom door close. More discreet than vanishing into thin air.

Five minutes later she put a cold bottle in my hand. "If something like that were true, Stan, there would never be enough cops to live on a world like ours, become part of it, and be able to move freely when a vulture struck."

I took that as confirming the source—the *gift*—of my sudden weight loss and return to heart health.

"You can use all the local help you can get, can't you, Ania?"

Silence for several seconds. "A cop can't be everywhere." Another silence. I waited. "Yes."

"You've got it, Ania."

She put her hand on top of mine. "Thank you, Stan."

More silence, broken by the rustle of the wind, the soft lap of water on the shore, the creak of my old lawn chairs, and Ania drinking beer.

I said, "Did you catch her?"

"About an hour ago. You tagged her when you put your cuffs on her. Don't ask me why we could track your cuffs, but not the jewels, candlesticks, and such. Be like explaining quantum mechanics to Pythagoras. It was a merry chase, they tell me. We've been after her for years." She squeezed my hand.

"Glad we got her," I said.

"Thank Grandpa. He's not as quick as he used to be, but he hasn't forgotten how. He's about to retire and leave the shop to me. Want to join me in the . . . *antiques* . . . business? When you . . . *retire?*"

The idea had a sudden appeal. And a sure sense that when she said "join me," she meant much more than just a business and police partnership. I said, "Might be . . . *interesting*. Sure, Ania."

She squeezed my hand again, not the way Myra used to, but with the same message. I felt no need to say anything more.

After another silence, she said, "How did you know she was the black hat and I'm the good guy?"

"I knew you were a cop the minute I saw you."

"How? Nobody ever guessed."

"Takes one to know one, Ania." ■

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What Drives Cars

Carl Frederick

People—or things—good enough to do a good job are likely to have ideas of their own. . . .

Paul Whitman stepped into his car and relaxed. He'd only had the vehicle, Victor-16, for a week but he'd already become attached to it—even fond of it.

"Shall I drive you to Central High School?" said Victor.

Paul smiled. Victor's voice, eager, youthful, enthusiastic, always reminded him of the kids at the school where he worked as a guidance counselor. Perhaps that alone explained why Paul felt a fondness for the vehicle.

"The high school, yes," said Paul. "But stop first at the CoffeeNuts drive-through."

"Yes, sir." Victor rolled out into traffic. "The family says there's congested traffic on Route 611. May I take an alternate route?"

"Yes. Thanks." Paul felt sheepish thanking a car, but it was hard not to think of Victor as a person—a person with a family.

The Victor Class vehicles were a set of two hundred concept cars: voice recognition, artificial intelligence, and interconnectivity through the cell-phone network. They ran on ethanol and had very large fuel tanks—necessary, as there were only a few service stations with ethanol pumps in southeastern Pennsylvania—the Victor Vehicle test region. Paul knew he was lucky getting one of them to test drive—but then again, having a brother who was the Head of Victor Programming certainly helped.

Paul, in the driver's seat, did nothing but watch as Victor negotiated through the traffic. His hands twitched involuntarily on the wheel; it was hard not being the driver. Ahead, he saw the CoffeeNuts and leaned with the motion as Victor swung into the drive-through lane. He pushed the control to lower the window—it was easier than asking Victor to do it—and gave his order: a coffee and a cruller.

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"Wouldn't a banana be healthier?" said Victor.

"What?" Paul glanced in surprise at the speaker grill. "CoffeeNuts doesn't sell bananas."

"Oh."

While Paul inhaled the aroma of fresh coffee intermingling with the smell of donuts and new car scent, Victor pulled back onto the road. Paul was sure the car maneuvered gently so he wouldn't spill his coffee. Paul shook his head in wonderment. Victor seemed not only intelligent; the car seemed considerate—and actually sentient. *That's ridiculous! It's just software.* He snapped on the radio to listen to the news over breakfast.

The hot news of the morning was from Harrisburg where, later that day, the State Legislature would vote on the ethanol proposal. If it passed, the ethanol plant in Ethantown would be tripled in size, making it the largest biofuel refinery in the nation. A heated floor debate had gone on for several days now, but Paul wasn't in the mood to listen to any more discordant sound bites. He rubbed his hands together to erase the thin pale patina of confectioner's sugar, then flipped off the radio.

"Do you think it will pass?" came Victor's voice.

"What?"

"The ethanol bill," said Victor in an eager voice. "Do you think they'll pass it?"

Paul, again astonished at the mental capabilities of his car, was reminded of the kids he counseled; he'd always strived to treat them as young adults and not children. Perhaps he'd have to treat his car the same way. He gazed at the little Norwegian troll doll he'd hung from the rear-view mirror to give a touch of individuality to his Victor.

"Well, do you, sir?"

"The ethanol bill," said Paul. "No. I don't think it'll pass. It means the state borrowing a lot of money. And it would mostly benefit the Midwest corn producers. Their farm subsidies would go up—along with our taxes. So the bill isn't popular with a lot of Pennsylvania politicians."

"But isn't it popular with people?"

Paul chuckled. "I'm not sure it matters. It's the politicians who get to vote on it."

"In Harrisburg?"

"Yes." Paul wrinkled his nose. Victor sounded very much like one of his high school kids: unfamiliar with the world, but alert and quick to learn.

After some silence, Victor said, "That's too bad. We'd really like it to pass."

"We?"

"The family."

After a further few seconds of silence, Paul said, "Victor." He spoke softly, trying to keep a troubled tone out of his voice. "Phone my brother, please. You might try his home first."

"Yes, sir." After a minute or so, Victor said, "He isn't home. But his car, Victor-5, is in motion. Should I call him there?"

"Yes, please, and"—Paul glanced at the cabin's front camera lens—"Videophone, if you would."

"Dialing."

A video screen on the dashboard came to life, and showed the face of Paul's brother, Jonathan. After exchanging greetings and small talk, Paul broached his concerns—but with uneasiness as he knew Victor, the object of his concerns, could hear every word. "You know, Jonathan," he said with forced lightness, "Victor here seems quite, um, intelligent."

"What would you expect?" said Jonathan with a laugh. "My team does good work."

"In fact, the car seems almost, well, self-aware."

"It *emulates* self-awareness."

"It emulates it very well," said Paul, feeling slightly less troubled now. "In fact, I can't tell it from genuine sentience."

"I'm glad. But it's only programming." Jonathan gave a snort of a laugh. "John Searle's Chinese Room idea argues that

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computation isn't even AI, much less sentience."

"On the other hand," said Paul, "Victor passes the Turing Test—at least for me. Alan Turing might say the car *is* sentient." He chuckled. "A Turing car, so to speak."

Jonathan smiled, but Paul could tell that something lay heavy on his mind. "Come on, brother. You're not telling me everything."

"Well," said Jonathan. "I have to admit the Victor cars are showing a lot more intelligence than I expected—a human intelligence."

"How is that possible? Your team programmed them."

Jonathan nodded. "Connectionism, maybe. We didn't take into account that the individual cars link together through the cell phone network." He pulled a cell phone from his pocket and gazed at it. "And these phones are little computers in their own right—not to mention the network computer system that controls them."

Paul gazed over Victor's artificial leather upholstery. "Are you saying that the networked Victors and cell phones have created a true sentient creature?"

"True *synthesized* sentience," said Jonathan, in a voice lacking conviction.

"I've got to say I'm a little uneasy," said Paul, "about machines showing sentience—even *if* only simulated."

"Get used to it," said Jonathan with a smile that seemed forced. "It's coming." His smile turned more genuine. "*I* think you should become a guidance councilor to the Victor family. You know I could get you a job here." He nodded out the window as Victor-5 pulled into the company parking lot.

"Yeah, yeah."

"Why work with your surly teenagers when you could work instead with smart cars? Smart *surly* cars, if you'd like. I could arrange it."

"Thank you, Jonathan," said Paul with a sigh. He'd had this conversation with his brother many times. "Talk to you later." He ended the call.

Paul polished off his donut and washed it down with lukewarm coffee. Then, casually glancing out the window, he noticed that the landscape had grown noticeably less urban. "I must say, Victor, that you seem to be taking a rather out of the way route to Central High School."

The car didn't respond.

"Why don't you answer?" said Paul.

"There is nothing to answer. You made a statement. It wasn't a question."

"Come on. You know what I meant." Paul watched as the car took the Route 1 exit to I-76.

Again, Victor didn't respond.

"Victor!"

"I'm sorry," said the car, "but the family has decided we will all drive to Harrisburg in order to pressure the legislature to vote for the Ethanol Expansion Bill."

"What?"

"I said, I'm sorry, but the family has—"

"I heard what you said." Paul struggled to keep his voice steady. "Are you telling me you're not driving me to the high school?"

"Yes."

"Then let me out."

"No," said Victor, firmly.

"This is . . . this is kidnapping!"

"You're not a kid."

Paul slapped the dashboard in frustration. "Stop playing word games! What's going on?"

"The family has decided we will all drive to—"

"Okay, okay."

Paul snaked a hand out to push the manual override button—but nothing happened. He clenched his teeth. *Fine. Just fine. A computer-controlled override switch.*

He fumed in silence as Victor drove toward the state capital. He knew he should be frightened, being a kidnap victim as he was. But it didn't *feel* dangerous; Victor was driving very responsibly. Paul considered using his own

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cell-phone to call for help, but decided against it. He was curious to see what Victor was up to—and he definitely didn't want his car listening in.

A half-hour later, he saw a road sign announcing a rest stop in two miles. Just then he became aware of his body's disposition of his coffee. "Victor. Could you pull in to the rest stop? I've got to pee."

After ten seconds or so, Victor answered. "I'll stop and let you out if you promise to come back."

Paul pursed his lips. "Okay," he said, operating under pressure. "I promise."

Victor pulled in and parked directly in front of the Comfort Facilities. "I'll wait here," said the car, "while you go into the rest station and attend to your exhaust pipe problem." The door clicked open.

As Paul stepped out of the car and headed for the restroom, he scrunched up his nose. *Attend to my exhaust pipe problem? Was that humor?* He let out a breath. Sometimes Victor seemed to have a great facility with the language and the subtleties of meaning, but sometimes it seemed to have the comprehension of a four year old. Paul wondered if that was because of the vagaries of networking, or whether Victor was just playing with him. *Maybe Jonathan would know.* And maybe his brother would know what he should do now. Paul did attend to his tailpipe, then pulled out his cell phone and phoned Jonathan—but the line was busy. He waited a minute and tried again with the same result.

Paul heard an angry honking from outside. It sounded like Victor's "voice." Paul felt torn; he'd given his promise to Victor-16, but . . . *No. Curiosity has its limits. There's no way I'm going to let myself be a captive of my own car.* He tried Jonathan yet again. Still busy. He tried Bjørn Peterson, Director of Victor Operations. That line was busy as well. Paul could easily imagine why. Victor honked again, more insistently this time. Paul blocked it out of his mind and tried his brother for the fourth time. He breathed a sigh as the call rang through.

"Paul," came Jonathan's voice. "Are you all right? It's a zoo here."

"Yeah, I'm okay. I'm hiding out in a smelly men's room at a rest stop on Route 76." Paul heard the rev of an engine and the sound of a car speeding off. "And I think Victor-16 has just left for Harrisburg without me."

"All of the Victors are heading for Harrisburg." Jonathan sounded harried and frantic. "Most have passengers inside who are scared out of their minds." He let out a breath, sounding like a gust of wind over the phone. "I wish to hell I knew why Harrisburg."

"Oh, I can tell you that," said Paul. "The Victor family wants—"

"Wait! Bjørn should hear this. Let me twin him in."

Bjørn came on the line and Paul exchanged greetings with him—in Norwegian. Paul had been a high school exchange student in Oslo. Ever since, he'd looked, with little success, for Philadelphians with whom he could converse in the language. Bjørn, loquacious and with a wacky sense of humor, was a great find.

"Okay, okay," said Jonathan, annoyance in his voice. "Let's get to the point—in English, please! Paul. What can you tell us?"

Paul repeated what he'd learned from Victor.

"*Kjaere Gud!*" said Bjørn. "Lobbying for the ethanol bill? Unbelievable!"

"What do these cars want?" said Jonathan.

"You've got to think like a car," said Bjørn. "Paul. Can you do that?"

Paul bit his lip. Things must be serious; the Norwegian seemed to joke most when there was big trouble. "Am I a convertible?" said Paul, trying to match Bjørn's humor. "I like convertibles."

"A used convertible," said Bjørn. "But I've a spray can of new car smell for you."

"Come on, guys," said Jonathan. "This

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is serious."

"Ja, you're right," said Bjørn. "Sorry." He gave a loud sigh. "All right, then. What drives cars?"

"Bjørn!" Jonathan sounded seriously annoyed.

"Wait a minute!" Paul thumped a fist to the washroom wall. "I think Bjørn has hit it. Think like a car! The cars seem to be acting out of self-interest: making sure they'll have a secure supply of ethanol—"

"You're saying these cars have genuine desires?" said Jonathan. "I don't think so."

"Bjørn asks what drives cars," said Paul, softly, thinking aloud. "Well, we do!"

"Paul!" snapped Jonathan.

"Wait. Hear me out," said Paul. "Cars are driven by us—by the need to serve us and protect us."

"Sounds like a dog," said Bjørn.

"No. Like teenagers," said Paul. "Inexperienced with the world and idealistic."

"It might make sense," said Bjørn. "I did program in the three laws of robotics."

"All right. Even assuming you're correct," said Jonathan, "how does that help us?"

The three were silent for a few seconds. Then Paul said, "If we could find reasons why the ethanol plant would be bad for people, on a website or something, I think Victor, the Victor family, would end their attempt to pressure the legislature."

"And if we could get Victor to read the website," said Bjørn.

"Is there a way I could contact my Victor?" said Paul.

"Why?" Jonathan sounded suspicious.

"I feel guilty for lying to my car," said Paul. "I want to talk to him and . . . and ask him to come back for me."

"What?" Jonathan exploded. "Are you nuts? This isn't one of your wayward teenagers. This is . . . I don't even know what it is anymore."

"They *are* like wayward teenagers," said Bjørn. "Wayward teenagers with wheels. And that could be dangerous."

"No, I don't think so." Paul adopted a professional tone. "Like a teenager, Victor is only overreacting." He took a breath. "Is there any way I can contact him?"

"Contact him?" said Jonathan hotly. "It's not a him. It's a friggin' car!"

"Well," said Bjørn. "Each Victor has its own cell number—so the cars can intercommunicate. We'd run out of IP addresses. Modem communications, but they can also do speech—so owners could phone their cars to come and pick them up. But there were legal problems."

"Great!" said Paul. "Let me have Victor-16's number."

"I think Jonathan might be right. You *are* nuts." There was the sound of keyboard clicks. "But here it is." Bjørn recited the number.

"Okay," said Paul. "I'll phone now. And I'll call you back afterwards."

"All right." Jonathan sounded resigned to the situation. "Good luck, Paul."

"Thanks." Paul broke the connection and dialed Victor-16.

The line connected. "Hello," said Paul over the modem connect sounds.

A voice came on—not the voice Paul associated with Victor-16, but something mechanical and very obviously synthesized.

"You have dialed the wrong number," said the voice. "Please look up the—"

"Victor," said Paul. "Victor-16. This is Paul Whitman. I'm sorry I didn't come back to you."

There came no reply. After ten seconds or so, Paul said "Victor?"

"You didn't come back." Now the voice sounded like the Victor Paul remembered. "I waited for you." The car sounded hurt. "And you didn't come back."

"I'm sorry," said Paul softly. "I . . . I was frightened."

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"I wouldn't hurt you." Victor sounded offended at the idea.

"I know. I shouldn't have been frightened. Please come back and pick me up."

Again, there was silence on the line.

"Please."

After another couple of seconds of silence, Victor said, "All right. There's an exit in 1.6 miles. So I should get back to the rest stop in about fourteen minutes."

"Thank you."

Victor broke the connection.

Paul walked outside and phoned Jonathan and brought him up to speed.

"Interesting," said Jonathan.

"And one more thing," said Paul. "Victor seems to show emotions. I wouldn't have thought that possible."

"Synthetic emotions. Bjørn's doing."

"Impressive! Tone of voice showing emotions. Very human."

"Wait until you experience the Victor sense of humor," said Jonathan. "Bjørn and his team spent almost a week indexing a pun dictionary."

"I *have* experienced it, thank you." Paul saw Victor pulling into the rest area. "Ah. Here comes my car. Have you found an anti-ethanol website yet?"

"No, not yet. But we're working on it."

"Well, Jonathan, work fast. I've got to go." Paul closed the connection and jogged toward his car—passing a man who'd just gotten out of a Nissan and was staring slack-jawed at the driverless car easing up to the curb.

Paul reached his car and hopped into the driver's seat. "Hi, Victor."

"Hi!" Victor sped off. "I'll have to hurry to catch up to the rest of the family."

"Stay under the speed limit, please."

"I'm sorry, but I'll have to go six miles per hour faster than the limit. But I'm talking to the family and also to some trucks to find out where the police cars are—and I have a very advanced radar system. So you're safe. Do you want to watch television?"

"What? No. I'm fine. Are we still going to Harrisburg?"

"Yes. Do you want to play a video game or surf the Net?"

"No." Paul thought about trying to dissuade Victor from his mission, but decided to wait until Bjørn and Jonathan came through with some ammunition.

That ammunition came a quarter hour later in a call from Bjørn. As a stratagem akin to parents spelling out words in front of small children, they spoke Norwegian.

Bjørn gave a website URL. "It says that ethanol from corn makes people and cars compete for food. It says that already in Mexico, corn prices have risen so much that people are having trouble affording corn flour—the basic ingredient in tortillas. People are starting to go hungry so cars won't."

Paul worked to translate Bjørn's words to English. At length, he said, "That's terrible. Is it really true?"

"I don't know. Maybe. Probably."

Paul had Bjørn repeat the URL. Then he broke the connection and turned his attention from his cell phone to Victor's forward camera. "Victor. I've changed my mind. I *would* like to do some web surfing."

A keyboard slid out from below the video monitor and a web browser appeared on the screen. "Terminal ready," said Victor.

Paul keyed in the URL and read the page. It was excellent ammunition. "This is interesting, Victor," he said. "It's about the Ethantown ethanol plant. I'll read it to you."

"I can read it myself." Victor-16 sounded almost petulant. "If you will move your head five centimeters to the left, I can read it from the rear camera."

"You have to use a *camera* to view a web page?"

"Yes."

Paul shrugged then leaned toward the window.

"Thank you," said Victor.

After almost a minute where Victor hadn't said anything, Paul said, "Did you

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read it?"

The car didn't answer. After another five or so minutes of silence, Paul took out his cell phone to call Jonathan. But then he noticed Victor driving off the Turnpike onto the Route 176 cutoff toward Reading. Apparently Victor had changed his plans. *But where is he going now?* Almost by reflex, Paul dialed his brother.

"Jonathan," he said when the call went through. "My Victor has turned onto Route 176."

"Yeah, we're tracking them. The family isn't going to Harrisburg. Your idea seems to have worked."

"Well, where are they going then? It looks like Reading, but there's nothing in Reading."

"At Reading," said Jonathan, "they could take 222 toward Allentown. Not that there's much more in Allentown."

"Allentown!" Paul sucked in a breath. "Not Allentown. I'll bet they're going to Ethantown."

"The ethanol plant?"

"Yeah. That's my guess."

"Why?"

"I think . . ." Paul felt awkward talking since the car could hear everything he said. "I think they're going to blockade it or something."

"That's crazy. Why?" Paul could hear a tinge of hysteria in his brother's voice.

"Overreacting teenagers with wheels, as Bjørn said. My guess is that the Victors have decided that the ethanol plant will cause human suffering. And—"

"Wait a moment," said Jonathan. "I've got an incoming e-mail marked 'critical.'"

Paul held the line and after a few seconds, heard his brother whistle through his teeth and then say "Holy shit!" under his breath.

"What's going on?"

"The Victors," said Jonathan in an incredulous voice. "They're phoning media outlets—newspapers, radio, and TV stations. Massive national calling, thousands of calls. I don't know how the cars can do it."

"Maybe . . ." said Paul, an idea suddenly occurring to him. "Maybe it's the phones that are phoning the media."

"What?"

"I mean," said Paul, "that cell phones, smart phones, themselves have a lot of computational power. But linked to the Victor class cars and the regional phone management computers, they might become very, very smart."

"God, that's all we need," said Jonathan. "First intelligent cars and now what . . . sentient phones?" He gave a hysterical bark of a laugh. "What do phones want? More call volume? Do they want more people to talk to cars?"

"Jonathan."

"Or maybe they want better reception—more bars. More towers. Happy conversations? Repeal of hands-free legis—"

"Jonathan. Focus!"

"What? Oh."

"What are the phones saying?" said Paul, calmly.

"They're saying . . . Well, they say they're going to crash into the Ethantown plant, all at once, two hundred cars, as a protest against hunger. They're demanding all ethanol plants be closed."

"Wait a minute!" Paul shouted. "There are people in most of those cars—including me."

Victor's voice came from the dashboard speaker. "Don't worry, sir. You will be safe. The family will release our passengers before we destroy the ethanol plant."

Paul jerked his head toward the speaker. "But you'll destroy yourselves as well."

"It is unavoidable."

Paul thought he could detect sadness in Victor's words. "Did you hear all that?" Paul whispered into his cell phone. "The cars intend to commit suicide or autocide or something. We've got to stop it."

"Yeah, I know," said Jonathan. "I've

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got to think."

"Get Bjørn on the line. We need to talk Norwegian."

"Understood. Hold on a sec."

While he waited, Paul asked, "Victor. How long until we arrive at Ethantown?"

"About fifty minutes if traffic moves at the speed limit."

Then a voice came on the line. "Could I perhaps interest you in a used bicycle?" It was Bjørn, speaking Norwegian.

Paul too switched to that language. "Bjørn. We've got to do something. I assume we can't just switch the cars off. I tried the manual-override switch, but it didn't work."

"Engineering design flaw, that switch." Paul heard a sigh. "In manual mode, we could command the cars off, but in auto mode, no." Bjørn gave a harsh bark of a laugh. "Auto mode. How appropriate."

"Could we maybe upload a virus of some kind?"

"Not a chance! Considering the application's potential risk, the Victor units have better virus protection than the Pentagon—not that that's saying much."

Paul wrinkled his brow. "You know," he said, tentatively, "if these *were* teenagers instead of smart cars, I'd say they were not having enough fun. Teenagers are idealistic, but they like to have fun."

"How does a car have fun?" said Bjørn. "Running over women with baby carriages, maybe?"

"Wait a minute." Paul glanced at the video monitor. "Maybe you have something there. Virtual baby carriages."

"Excuse me?"

"Victor asked me if I wanted to play a video game. Is it possible for Victor to play also?"

"No. Not at the moment."

"Too bad."

"But," said Bjørn, "it's just a configuration file change. And I can upload that."

"Hey, great! Let's try it. Maybe we can get the Victors hooked on video games."

"In fact," said Bjørn with what would pass for enthusiasm in a Norwegian, "there's a game in the library where cars do run down things. I could enable that."

"Terrific," said Paul, before having second thoughts. "Wait. No. I don't want to give Victor ideas. Find another game."

"How about a spaceships and aliens game?" said Bjørn. "And it's multi-player; the cars could play each other. I could enable it in just a couple of minutes."

"Excellent! I'll see if I can get Victor to cooperate. Call you back when I know." Paul heard murmurings. Bjørn was probably filling Jonathan in on the plan. Paul broke the connection.

Paul took a deep breath. "Victor," he said. "I think I *would* like to play a video game. One with spaceships if possible."

"Yes, sir."

Instead of a keyboard, this time a game controller slid out from under the monitor. Awkwardly, Paul took it up. He'd not played a video game in years and though he'd enjoyed them as a kid, he'd never been good at them. He played a game—a very short one; he was now even a less skillful player than he'd been as a boy. He played a second game, and a third. He felt as if Victor were looking over his shoulder—which of course, was the idea. But it still embarrassed him to have someone witness his incompetence, even his car—especially his car.

After his fifth game, Paul asked, "Victor. Can you play this game?"

"I can," came the answer. Paul thought he could hear surprise in Victor's voice.

"All right," said Paul. "Play it. I'll watch."

Paul watched as his avatar moved around the screen—slowly at first, then with increasing speed as Victor apparently got the hang of it. Finally, the avatar moved almost more quickly than Paul could follow.

"You know, Victor," said Paul, his

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guidance councilor instincts rising to the surface. "It is good to have fun. Idealism is good, too. But there's no need to die for it. You can't do anything when you're dead." The avatar moved ever faster, shooting at everything else that moved. "Do you understand what I'm saying, Victor?"

"Yes."

Shaking his head, Paul rubbed a hand across his temple; he could recognize a teenager—or a car—tuning out when he saw it.

He turned his attention back to the screen. Another avatar had joined the fray. "What's that?"

"Victor-124 has joined the game."

Soon the monitor swarmed with avatars zipping around and shooting aliens and each other. Paul couldn't begin to follow the action.

"Please, sir," came Victor's voice, sounding choppy and unnatural. "Would you mind taking manual control?"

"Not at all." Paul grasped the steering wheel and then breathed a sigh of relief as he felt the car respond to the movement of his hands. "Do you mind," he said, "if I drive back to Philadelphia?"

"No." The reply wasn't immediate; Victor clearly had other things on his mind.

In a tenth-floor corner office in the Advanced Concepts Division building, Paul and Jonathan gazed out on the parking lot below. Bjørn, also standing, stared at a desktop monitor.

"Look at them down there," said Paul in a melancholy tone. He scanned the lot littered with the Victor class cars, all identical dark blue compact sedans. "Inert. Lifeless." He turned to his brother. "What'll happen to them?"

"The Victor systems will be decommissioned—not destroyed." Jonathan gave a sympathetic smile and patted his brother on the back. "Whatever intelligence was there will be preserved. The networked computer units will be given to the Institute for Machine Intelligence. And I'm sure the Institute will put them to good use." He chuckled. "That is, if they can ever get the units to stop playing computer games."

"Ah," said Bjørn, "you haven't heard. The Victors have been lent to one of the online virtual communities. They'll still be smart cars."

"Hey," said Jonathan. "I like that."

"Me, too," said Paul. "I've sort of grown fond of my car. It'll be good to drive it again, even virtually."

"Yes, the Victor family will roll again," said Bjørn, "but this time in cyberspace."

"Well, at least in real space, it's over." Jonathan sighed. "I don't think we'll be building any more smart cars in the immediate future."

Paul could tell from Jonathan's voice that he was worried for his job. *The Philadelphia school district is looking for a Director of Instructional Technology. I wonder . . .*

"It's not quite over," said Bjørn, his eyes drawn to his monitor. "We're still getting reports of phone calls to media outlets."

"What?" Jonathan turned to the monitor. "Phone calls from whom?"

"I don't know," said Bjørn. "From the phones themselves, it seems."

"That's impossible." Jonathan squinted in puzzlement. "Probably just system latency. They'll go away soon. It *is* over."

Paul absently slipped a hand into his pants pocket. He encountered his cell phone and thought of the little computer, the little brain, inside it. Little, but connected to not merely two hundred others, but to hundreds of thousands of phones through an intelligent network. He smiled, his melancholy fading. *Maybe it's not over. Maybe this is just the beginning.* He considered the possibilities. Should he ever decide to switch jobs, here it was: *Guidance councilor to the phone network.*

The idea had its charm. ■

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Consequences of the Mutiny

Ronald R. Lambert

Long-term plans involving human beings are very likely to jump tracks. . . .

Aaron Land told himself that he knew better, but his emotions could not be denied. He wept with his wife, as they looked down on the still form of their one-month old daughter, Aria.

He managed to steady his voice, so he could say, "Cinthi, you know she's not dead. Only in stasis."

His arm encircling her shoulders squeezed as she nodded. After a few moments she managed a low whisper. "Say it again. My head knows, but my heart doesn't."

The plastine enclosure protecting their child also prevented them from touching her. All the readouts were green; he drew what comfort he could from that. Cinthi could not help but futilely stroke the plastine. The stasis field within the enclosure gave their child's features a reddish cast.

At length he was able to lift his gaze and take in the ranks of stasis tanks, most small and compact like the one that held their child, interspersed with a few adult-sized. They took up less space than the stasis tanks in the main storage chambers that held the mostly adult colonists, waiting to walk on their new world. But there was not much more room here. It was a serious concern whether the *Pitcairn Island* would be finished in time, before the crew ran out of spaces for storing their children.

Once they had moved to the new, larger ship their nanotechs were constructing, they could send the old *Magellan* in-system, so the colonists could be revived and ferried down to the surface of Epsilon Eridani II to establish their colony. That would fulfill their original contract, more or less. But as things looked now, it would be several years yet before the crew could be reunited with their young.

There was a scent in the air of lavender, probably meant to add esthetic ap-

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peal to this chamber filled with machinery, but it seemed like a mockingly false sweetness. Aaron knew that as long as he would live, he would never again care much for the scent of lavender.

It would have been a mercy, of course, if everyone had been able to abide strictly by the population limitation quotas. They were allowed to replenish their numbers to ensure future generations of crew, but the quotas fluctuated from day to day, and you never knew whether your baby would be allowed to grow up with you, or have to be consigned to stasis. And yet people will be people, and in the heat of the moment, birth control measures might occasionally be forgotten, especially when the "failsafe" of being able to place excess children in stasis was available. That option did not seem so good, now.

The technicians had been holding back respectfully. Now they softly stepped forward and murmured regretfully that it was time to go. Another couple waited, and it seemed best to do this horrific thing one couple at a time.

It seemed cruel to wait a month before committing the newborn to stasis, for that allowed parent-child bonds to form strongly. But medically it was necessary to wait for the infant to reach a certain level of stability before exposing it to the stress and rigor of being placed in stasis.

He found a prayer in his heart, running like a tape in an endless loop. *Please God, let nothing go wrong. Let our Aria be restored to us live and healthy, when the time comes for her to awaken!*

As they stepped away reluctantly, Council Rep James Mitterand nodded to them by the exit door, respectfully and patiently awaiting their approach. A soft bustle of distant steps hinted of the next couple entering, babe in arms, through another door. Before they were drawn to turn and look, Mitterand called their names, and they went on to him. He was at least a decade older than Aaron, but was no stranger. With a population of only two thousand, everyone got to know everyone, eventually.

The older man stepped aside for them, and fell in beside Aaron. The emerald light of the main habitat cylinder flooded all around them. The warm, moist air with the distant hum and chittering of insects and cries of birds and the continual whisper of fountains spoke to them of home. They took for granted the landscape high over their heads, having been born and raised in the O'Neill type vessel. It was all they had ever known.

"It won't be long," Mitterand promised them. His tone was firm even though he spoke softly.

Aaron squeezed Cinthi with his arm around her shoulders. "We know. But it's still hard." Out of the corner of his eye, he caught Mitterand nodding.

"My wife and I have been looking forward to the Morning Waking for three years now. Lots of people have been waiting even longer."

Morning Waking. Suddenly a thrill went through Aaron's heart, as those words took on a new, deeper meaning than they had before. People often spoke of it. He had himself. But before it was only something of intellectual interest. Now that he had a personal stake in that Morning Waking, he cared greatly, and longed to see it come.

"You know, we are lucky, being part of the seventh generation of crew," Mitterand went on. "Some infants have been in stasis for generations—so long that even their parents chose to go into stasis before becoming too old themselves to care for their children when they awoke. They will awaken with their young, but they will be middle-aged."

Aaron had never thought much about this before. It was merely one of the facts of existence everyone knew about and took for granted. "James, are we going to make it to Morning Waking?"

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Mitterand replied somberly, "As you could see, the auxiliary hold is nearly full. We couldn't keep going like this for another generation. We're right on the verge of outstripping our capacity for life support as it is. The council has been seriously considering introducing rationing."

Aaron remarked wryly, "These are all consequences of the mutiny."

Mitterand chuckled. It was a common, often-repeated in-joke. Perhaps not really funny, except to the great-grandchildren of mutineers.

Those who commissioned the O'Neill type starship had known that you could not just send out a ship of sleepers in stasis. You had to have a living crew. No machinery made by man, no matter how sophisticated its self-repair capability, could be trusted not to break down over the course of centuries. You had to have a living crew to keep the ship in good repair, and the crew had to be able to replenish itself through normal reproduction and had to be given a comfortable home.

The mutiny, however, had been unforeseen.

After the first generation of crew had either died or been committed to their own stasis tanks, most of those who arose knowing only life within the ship had little desire to take up residence on the surface of a planet. It sounded scary and vulnerable, unsheltered and exposed to the universe that way.

The ship was equipped with the means to hollow out asteroids and manufacture duplicate ships. Their nanotechs could be programmed to construct nearly anything. The original intent was for each colony, after it became established, to then build and send out more colony ships. But this meant that there might be a delay of many years before the new ships would be launched, since the resources of the original ship would be needed to establish and develop the planetside colony.

Originally the crew had only numbered one thousand. Double that number theoretically could be supported by the ship's renewable resources, which was thought to be a comfortable margin. But long ago the maximum limit of two thousand had been reached. This was in addition to the capacity for eight thousand crew to be stored in stasis if needed. But there were fifty thousand colonists in stasis. When they were revived, they would greatly outnumber the crew—and outnumbered meant outvoted.

After more than a generation of debate and simmering disaffection, finally the crew decided to defy the planners back on earth. They would still deliver the colonists to their target planet, but only after the crew had made a new starship for themselves first, and set off on their own, out of reach of the "landers." A small skeleton staff of volunteers—consisting of the handful of crewmembers from the third generation who had resisted the mutiny and been forced into stasis—would be revived and remain on the *Magellan* to revive the sleeping colonists.

The three of them walked in silence for a while along the flagstone pathway into the narrow band of trees that separated the mech doors from the living space. Finally Mitterand spoke again, softly: "The Council offers you another week of holiday, for—ah—coming to terms with things. If you want it."

Aaron shook his head. "I've been off quite a bit already, full or part time. I think I need to get back to work."

Cinthi swallowed. When she spoke she seemed fairly well composed, even if her voice was a little husky. "I've had light duty for a couple of months now. I agree. I need to get back to work, too."

"Besides," Aaron added, "It's just a few more days until Thirteenth Week, when we'll all have a week-long holiday. I volunteered to be counselor for a unit of children setting up festival balloon-bells. I've kind of been looking forward to that. Some of my friends will be lead-

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ing similar units."

Rather than have holidays scattered at random throughout the year, the crew had long ago decided to take holidays all together in the last week of each quarter of the year, Earthtime. The one coming up was fourth quarter, which was Aaron's favorite, with its strong flavor of Christmas/Hanukah/New Year themes.

Mitterand responded, "That's true. And most people find the fourth quarter holidays especially cheering. Though I kind of like Third Quarter."

Aaron made a wry face at the thought of that Thirteenth Week, which combined elements of Thanksgiving and Yom Kippur, with an Azazel ceremony at midweek (using CGI hologram goats), which then led into the weirdness of Halloween costume parties and Trick-Or-Treating. It was the minor key Hebrew music with its rhythmic, dance-like songs segueing into Mussorgsky's "Night on Bald Mountain" that struck him as truly bizarre. Kids loved it, though. Of course.

"You like the candy, huh?" Aaron remarked.

The Council Rep chuckled. "Yep. I admit it. Course, also I'm part Jewish."

"What? How does *that* work?" Cinthi asked.

"Well, back when I was a teenager, I told it like this: My mother's Jewish, my dad's Catholic, but I'm *Protestant!*"

Aaron laughed. Even Cinthi managed to giggle a little. Mitterand definitely was not a pompous, stuffed-shirt type of politician!

He grinned. "I have an Adventist friend who tries to explain to me the Christian significance of the Jewish Yom Kippur. Something to do with the Judgment. But see, what I've discovered is that if you just keep an open mind and practice real tolerance, you can have a lot of fun. You can celebrate practically anything with anyone. We can celebrate each other's holidays! And that helps to bind us all together as a community." He paused a moment. "Oops, I guess that sounded a little 'speechy.' Sorry."

Aaron regarded him with a somber smile. "I see why the council sent you. You're good at what you do."

Mitterand touched a curled finger to his forehead, then looped his hand downward as he bowed, smiling.

Their gazes were drawn upward for a moment as a large flock of birds cascaded down from the heights.

"Looks like it's about time we scheduled another bird hunt," Mitterand observed. The ship's environment needed insects to pollinate the plants, birds to keep the insects in check, and periodic hunts with nets to keep the bird population in check. Unfortunately there was nothing to keep the humans in check.

Then the lights flickered and dimmed.

The three of them stood there, mouths agape, looking up at the three light globes connected by the power conduit that ran along the central axis of the colony.

"That's not possible!" Aaron breathed. But the lights were dimming to the point where he could make out the faint grayness of the fine mesh screen that kept birds and insects from immolating themselves in the plasma balls. In a moment, the light globes flared up again to their normal brilliance.

They exchanged looks. Everything had changed, now.

This was no accidental thing, no natural occurrence. Even non-engineers knew that the ship's internal power grid, like the engines, was supplied by quantum power generators that drew their power from quantum space. Though energy was not evenly distributed in quantum space, there was abundant power available even in the voids between stars. Here in the midst of the Epsilon Eridani star system, there should be more than enough power available. There should be no power fluctuation.

The only explanation was that someone must have hacked into the power control system. And if they could do that, then they could, potentially, do all

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kinds of mischief.

Aaron and Cinthi looked at the council rep. He spread his hands and began to shrug, but then his shoulders slumped, and he sighed. "We got an anonymous warning a couple of days ago that there was going to be some kind of 'demonstration.' We think it came from Save Our Children. The official leadership denies having anything to do with it, of course."

"What do they want?" Cinthi asked. "'Save the Children' doesn't sound like a bad thing."

"That's just the name, Honey. Not necessarily the agenda," Aaron said. "Especially if there is a hidden one. The question is *how* do they intend to go about saving the children?"

Mitterand nodded. "Don't quote me, but I have heard rumors that there is a radical underground that seeks to eliminate the colonists in stasis, to make room for more children of the crew, and remove any need for us ever to have to go to Epsilon Eridani II."

Aaron stared at him, horrified. "That would be murder! What could they be thinking? We don't want our society to be founded on murder!"

The council rep regarded him with a sad shake of his head. Before he could say anything more, he must have sensed an alert from his neural implant. He put a hand to his temple in the traditional way of signaling others that he was engaged in a neural communication. Then he glanced at them and said, "Emergency meeting of the Council. I've gotta go."

They thanked him for being there for them, and bid him goodbye as he made his departure.

Cinthi looked back at Aaron. "Consequences of the mutiny?" she asked, hesitantly.

Aaron raised an eyebrow. "Let's just hope it's not another one."

"Another—?"

"Mutiny. Another mutiny. Against us, this time."

Jos Stearman glanced up at Aaron. "Ready?" At Aaron's nod, he stroked the last controls in the sequence, and the stasis field vanished like evaporating pink mist. The capsule lid had already slid down into the base, so the upper half of the sleeper was now accessible.

Hurriedly Aaron applied the hypospray against the exposed flesh of the waking colonist. Sometimes the only way to do a thorough diagnostic and fix of the stasis tanks was to bring the sleeper out of stasis. But they did not want him to wake up.

George Proctor, acting as security guard standing a little distance away, was new at his post. He asked, "Why do you have to knock 'em out?"

Aaron smiled a bit wryly. "Oh, we don't want the sleepers to wake up at this point. They might begin to ask questions it would be awkward to answer. If they suspected the fact that there has been a change in the agenda—thanks to the mutiny—they might be upset."

Stearman put in, "And some of them are like this guy—he's a Roland, see?"

"'Roland'—what's that?"

Aaron quoted, "'He had the strength of ten, because his heart was pure.'"

"Huh?"

Aaron looked at Stearman and shook his head. "They're not teaching the classics like they used to." He turned to Proctor. "Sir Roland was a knight, who supposedly was much stronger than a normal man." When the light still did not go on, he added, "This colonist has some cyborg enhancements. Titanium-reinforced bones." He pointed at a diagnostic on the side of the tank. "If we did a microanalysis, we would undoubtedly find nano-fibers in his muscles and tendons. A few of the colonists consented to this. The planners figured it could prove useful having a few supermen to help start a colony on a new world."

Finally a light did go on. "So that's why I'm here," the security man said, patting the small pistol holstered at his

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side.

They finished their checking of the tank in silence, and switched the stasis field back on. Proctor turned away and strolled off, apparently intending to take a break until they would call him to the next tank that needed checking.

Aaron regarded Stearman closely, and spoke in a low voice. "This one isn't just a Roland, is he?"

Stearman shook his head slightly. "This is something we prefer to keep quiet. Some crew members might be upset to know about it." He kept his eyes steadily on Aaron until Aaron gave a nod.

"I see your point."

He regarded the group of eight eight-to-eleven-year-olds as they gathered around him. There were three girls and five boys. The thought occurred to him that he might feel some resentment because he and his wife were denied the right to have their first and only child with them, while all these other children were free to live with their parents. But no, that was not how he chose to see it. He was glad for the opportunity to work with the children and help them learn to play a useful part in the life of the community. He was glad that at least someone's kids got to grow up with them.

The argument was often raised that each couple should be allowed an individual quota of two children. That is the way it used to be done, several generations ago. But then some couples had a third child, and complained at having their newborn put into stasis, when there was still plenty of room left in the total quota for the crew. There was room, they pointed out, for the population to double. After much debate, the policy change had been made, so that the total quota for the crew was checked at the time of each childbirth, and if there was room, the child did not have to go into stasis. It had worked for a while.

He sighed and shook his head. Then he looked up and smiled at the eager, delighted looks on the kids' faces and the excited, joyful tones of their voices as they helped him unload the van. He suppressed a chuckle at their instinctive disorganization, and gave them a few simple directions to make their work go quicker and easier. He stepped in and took a hand himself, showing as well as telling, and sharing in the work. He could see they liked that.

He took a moment to look over the clipboard with the list of residents who had given permission for balloon-bells to be set up on their property. Thirty-five of the thirty-six yards were so noted. He didn't know what was wrong with Scrooge at the end of the block, but at least it was easy for the kids to know where to do their setups—all the yards until they reached the end of the lane.

Just as they were about to get started, he heard the hum of another van, and looked up as it stopped, and his friend, Art Merant, stepped down out of the driver's seat. One of his charges, a dark-haired kid who looked about ten or eleven, got off slowly behind him.

Merant had an apologetic look on his face, like he was about to ask a big favor that he thinks is not going to be very welcome.

"Hi, Art. What's up?"

Merant sighed. "I hate to put this on you, Aaron, but we've been having a problem with this one kid. He's incorrigible! None of the other guys have been able to do anything with him. You're the only one left. Will you give him a try?" He turned and looked at the kid who had gotten out behind him, and was standing with his arms folded in front of him. He waved a hand at him. "This is Matthew Terrell."

He looked from Merant to the boy, and shrugged. Frankly, he felt embarrassed by what Merant had said in front of the boy, and wanted to end the discussion before anything more that was hurtful was said. "Okay, Art." He nod-

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ded at the boy. "C'mon, Mat."

Merant gushed with gratitude. "Oh thank you, thank you, Aaron! I'm really sorry to put this on you, but everyone else tried and gave up on him. This is really appreciated."

Aaron winced, then nodded and turned quickly, giving a half-wave. For a moment, he could not even bring himself to look the boy in the eye. "You're welcome to join us, Mat." Then he went back to what he had been doing with the other kids.

Out of the corner of his eye, he kept track of young Matthew, who meandered over to the group of kids, but stayed on the outer periphery, with his hands in his pockets. After Aaron had given the first assignments out and most of the kids were tending to their tasks, he looked closely for the first time at Matthew. The boy had a slight scowl on his face, a look that might be one of impatience. But there was something about the way he carried himself, like not only did he not want much direction, he actually felt that he did not *need* it.

Aaron remembered something his father once told him about how children needed to be treated as individuals.

He decided to try something. He walked over to Matthew and pointed at the larger unit that was still lying on the ground, "Mat, have you ever set up a main carillon before?" It was the most important and complicated of the balloon-bells. Normally the adult counselor set them up.

"Sure." The answer came without any hesitation. "My dad let me do it before."

"Okay, then, I'll let you set this up. Use the handcart. It goes in lot 18, ten meters in from the sidewalk. I need to help these little kids over here—looks like the first time setting up balloon-bells for them." He hesitated just a moment, thinking how much trouble he could get into if things went wrong. "Uh, just make sure you keep your feet clear when the prongs slam down into the ground."

The young boy gave him an indulgent look and nodded. "Of course. No sweat!"

Aaron nodded, pointedly turned his back, and walked away. It was a struggle not to look over his shoulder and keep watching the boy out of the corner of his eye. But he felt he needed to let the boy know he was really leaving the challenging task to him.

The balloon-bells were extravagant devices that inflated a ring of illuminated balloons all around the central module, and also projected waving, aurora-like curtains of light up above the unit, which pulsed and danced in time to the music. For most of the balloon-bells, the music sounded like a bell choir, which chimed in response to any loud note a passerby might sing. Once enough notes had been sung to establish a recognized tune stored in the device's memory, the bell choir would expand into four-part harmony, and play the song as accompaniment to the singers. Balloon-bells as close as forty meters away would also take up the refrain, which then would activate still more distant balloon bells.

After a device was firmly anchored into the grassy lawn, and the safety switched off and the valve control twisted to inflate the balloons, it was necessary to conduct tests and make any adjustments in pitch or sensitivity that might be required. When everything was right, he had the two kids who had installed it sing a familiar song of their choosing. Usually the kids chose Christmas carols, but some chose secular songs, or popular Hebrew psalms or horas. Aaron offered a prize to anyone who could stump the balloon-bells and come up with a song that was not in its repertoire. So far, in his five years of leading these groups, none of them had been able to.

After a couple of balloon-bells had been set up and tested, he looked off in the distance at Matthew. He had not

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heard any screams yet; that was a good sign. The boy was not writhing on the ground, did not seem injured, and the main carillon balloon-bell seemed to be set up securely. Just then he heard the strains of choral music, accompanied by orchestra, as Matthew tested the device. Aaron smiled in satisfaction and pride. The boy had done well.

He went over to check, and sure enough, everything was registered and set properly. Matthew stood by, exuding confidence and pride. Aaron nodded. "Perfect." Then he held out his hand and said, "It's always nice to meet someone who knows what he's doing."

Matthew seemed a little stunned, then burst out into a sunny smile and shook the proffered hand.

"Would you help me with some of the little kids, Mat? They haven't done this before, and I could use your help with them."

Mat was momentarily speechless, but he nodded and followed Aaron as he headed back to the other kids.

With young Terrell's help, they finished their assigned route in good time. Then everyone climbed back aboard the open van and they went to the park, where the youth picnic was to be held. Aaron found the place assigned to his unit, and led them as they joined in to help prepare the picnic tables and campfires they would be using.

Terrell and he had just gotten the campfire going well when Merant walked up. He did not say anything at first. He just walked up to Terrell, took his head in his hands, and began closely examining him. "I don't see any marks or bruises. You didn't beat him. How did you do it? What did you threaten him with?"

Aaron exchanged grins with Terrell. "I didn't do anything," he answered Merant. "No threats were needed. Terrell's a good man!"

Merant walked away, shaking his head.

***

Aaron and Cinthi decided to spend the first day of the Thirteenth Week holidays at the park. Musical sounds were in the air, a cacophony of various Christmas carols and other cheerful folk songs that somehow blended together pleasantly. Everyone in the park was in costume, most with Christmas themes, some with Hanukah themes. Aaron and Cinthi were dressed as elves, with pointy hats and curly-toed shoes. They sat close to where he and his unit had cooked and eaten their after-work picnic.

Merant and his wife Celene, along with Sam Spruill and his wife, Anna, were sitting in lawn chairs discussing their plans for the day. Up over their heads, on the opposite side of the ship, they could see a baseball game being played between bearded Santas and toga-wearing Maccabbees. They had to keep an eye out for a pop-up or home run crossing to their side of the ship. Effective apparent "escape velocity" from the inner surface of the rotating cylinder of the ship was thirty-two feet per second—and a batted ball could exceed two-forty, if it were really tagged. The slight danger posed by the ship-wide ricochets added to the thrill and fun, all a part of the *Magellan* tradition. After all, they were each one children of mutineers, right?

Aaron noticed an older, dark-haired man walking up to their group, smiling. It took a moment for Aaron to recognize him. He remembered about the same time the man held out his hand and announced himself.

"Aaron Land, I'm Mark Terrell, Matthew's dad. I just wanted to thank you for the way you took Mat under your wing a few days ago. I know at times he can be a bit of a handful, but you must have done something right: He's been talking about you in glowing terms ever since."

The praise made him feel a little embarrassed, but at the same time it gave him pleasure to receive such praise in

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front of his wife and friends. Especially Merant, who had given up on the lad. Aaron hid an amused smile at Merant's dazed look.

A moment later he remembered some outstanding details concerning the man before him. This was the man widely regarded as the smartest in the crew. No wonder his son had shown such a marked sense of self-confidence! If he had half of his father's I.Q., he was head and shoulders above most kids his own age in competence and presence of mind.

"I could see he was ready to be given a looser rein, so I just let him do what he was able to do. And he did a good job with everything he did. He wound up helping me with the younger kids."

Terrell nodded. "Do you have children of your own? Oh, I'm sorry," he added quickly, noting the cloud that passed over Aaron's expression. He touched his finger to his temple. It was obvious he was reading the information about their first child, Aria, being committed to stasis so recently. He dipped his head again, sympathetically.

Aaron passed over it, and said, "My dad taught me that all kids are different—some require a tight rein, while others with a more independent spirit need to be given their lead, so to speak. It is the latter kind who become the leaders of the future, the ones who can change the world, if you can just give them the right kind of guidance and enabling."

Terrell nodded respectful agreement. "I will remember that. Your dad was wise. Is he still among us?"

"No, he went into stasis a couple of years ago. I have an infant brother who is in stasis, and he wanted to be able to raise him when the time comes."

"For Awakening," Terrell added, the capital evident in his tone. "I have a daughter in stasis. I hoped she could be awakened when my wife died."

Aaron remembered then, the bitter controversy when Marlene Terrell had been killed in a construction accident in space, and Mark had petitioned the council to allow their daughter to come out of stasis, since the death of his wife theoretically created an opening in the population quota. He had been denied on the basis of the unofficial First Law of Parenting: "Never let them outnumber you." The "law" had begun as a mere witticism a few generations back, but somehow had become hardened into policy.

"You got a raw deal," Aaron offered.

The older man sighed. "Many of us get a raw deal." Then he looked up, and there was a spark of something—defiance?—in his eyes. "Maybe a change is in order."

That called to mind another datum: Mark Terrell had become one of the most outspoken advocates of the Save Our Children campaign. Could he have been involved in hacking into the power control system a week ago, when the lights flickered? If anyone could do it, he certainly could.

"Hey, look over there!" exclaimed Celene Merant. Everyone looked to see where she was pointing. It took a moment for the incongruous sight to register: Ten, maybe twelve animals were prancing through and around the circle of the park bleating joyously, accompanied by scattered shouts, shrieks—some of them gleeful—and even laughter. The animals were somewhat deer-like, or goat-like, but with curlier hair and long necks. They were too small to be camels.

"What are they?" Cinthi asked.

"They look like llamas," Spruill answered in his breathy, tenor voice.

Aaron had not realized the ship had llamas in stasis. He knew a wide variety of animals were stored that way, about a dozen of each species.

"Llama-burgers on the hoof," Terrell said blandly.

They all stared at him, aghast.

A wry, knowing grin twisted his lips. "Well, then there'd be room for twelve

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more of our kids to be placed in stasis, places we might need before the *Pitcairn Island* is ready."

With a sinking feeling, Aaron figured his involvement in the Save Our Children demonstrations was all but confirmed. Cinthi evidently figured Terrell was in on it, too. She questioned sharply, "How many animals would you wipe out? All the ones in stasis? Leaving the colonists with nothing to start out?"

The older man did not deny her implicit assumption. He just waved his hand and said, "We still have thousands of zygotes in stasis, and eighteen artificial gestator/incubators. The colonists can still raise their flocks and herds. It will just take them longer to get them going. They can live on vat-cultured meat tissues like we do for a few extra years. Having twelve living specimens for each species was a superfluous backup."

"Twenty-four or more," Aaron corrected. "They're all pregnant females."

Terrell's smile vanished, and his jaw muscles tensed. He could not deny how bad it sounded that pregnant females might be killed. It had been ingrained in the human consciousness for millennia: Even hunters, hunting for food, did not knowingly kill pregnant females.

Suddenly the air was filled with a deafening sound Aaron had never heard before. An alarm klaxon. It was being sounded physically throughout the ship, not just transmitted via neural implants.

Everyone in the park seemed to jump and look around, in a near panic. The ball game above their heads stopped abruptly. Was the alarm just because of a handful of llamas running around? He frowned. No, that would not make sense. It must be something else. A quick survey with his com implant told him that an urgent message was being signaled on the council channel. Accessing it, he immediately heard shouts and screams—and what were those loud popping sounds?

A female voice overrode the sounds echoing in the council chamber. It must have been someone hiding in an adjacent room, using the council's com controls. The voice was panicky. "Security! We need all security, the whole force! Armed people are taking control of the council room. They have guns. They're shooting! The council is not in session, and there's just a standby staff. We're all unarmed!" The voice hesitated, broke. She swallowed, then added, "They have shot down the security guards who were stationed at the access doors to the colonist sleeper holds, and a bunch of people with guns are rushing in there. There are dozens of them! Oh, no—someone is breaking in the door here—" This was followed by muffled shouts, and a crash, followed by louder shouts, a scream, then a click. The channel went silent. A moment later, the alarm klaxon went silent as well. A deathly silence hung over the ship.

Aaron looked around. Judging by the dazed expressions, he figured everyone else had caught the transmission on the council channel, too. Then he swung his head slowly around to fix his gaze on Terrell. He found his voice and demanded coldly, "Are you a part of this?"

Terrell raised one hand halfway, a futile, helpless, confused gesture. "I—no, no! Not this! They weren't supposed to do this!"

Merant chimed in: "Do you know about the guns? How'd they get all those guns?"

When Terrell was slow to answer, Aaron filled in the obvious. "They probably diverted some nanotech resources to manufacturing guns and ammo. All you have to do is program those things, give them enough raw materials, and they'll make anything you want. They probably did it out on the *Pitcairn Island*, or maybe on one of the small asteroid work platforms, then smuggled them back in here!"

In a few places throughout the park, scattered individuals were jumping up and rushing off. They must be members

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of the security force, heading home to pick up their weapons. But what could they do? Wives were calling after them to come back. There were less than a dozen total members of the crew's official security force. And it was a long way on foot to reach the section of the ship where the offices, control rooms, and holds began.

A numb feeling gripped him as he realized this was historic. A second mutiny! And it was one that would doubtless succeed!

"What are they going to do?" Cinthi asked.

Terrell did not answer.

"They're going to kill colonists in stasis, aren't they?" Aaron thundered.

Terrell closed his eyes, and his head sank. "They used us," he said softly. "They used me," he added even more softly, then sobbed.

"It seemed like a clever prank. Hack the control system software, let loose a few animals. That's all it was supposed to be!" Terrell's tone pleaded for understanding, sympathy.

He got nothing of the kind in the faces of the people before him.

A moment later Merant murmured, "A diversion."

Aaron nodded at him, silently. Then he took a deep breath and declared, "We can't allow this. We can't allow all our future generations to know our community, our civilization, is based on wholesale murder—murder of innocent sleepers in stasis!"

Spruill frowned. "We can't *allow* this? How can we stop it?"

Celene Merant ventured to say, "Maybe we can get everyone to join together, let the attackers know that the whole crew is opposed to what they're doing it."

Aaron shrugged, thinking, *Good luck with that!* There was another idea that came to his mind, something that might actually work. But it was drastic. So drastic, he was not sure he wanted to discuss it openly in front of all the others. They might waste time by arguing against it. Instead he pulled Terrell aside and said, "You need to get out of here—and I need to talk to you."

Terrell's gaze swept around, taking in the people in the park, and did not need to be told why he needed to get out of sight. He was a known advocate of Save Our Children.

"Let's go to my house," Aaron urged. "Everyone knows where you live." As the two men started out at a trot, the fastest Aaron could move wearing his silly elf shoes, he asked, "Where is Matthew?"

"At home. I told him to stay at home."

Aaron tapped on his temple and said, "Call him. Tell him to meet us at my house."

Terrell nodded.

"Wait—where are you going?" Cinthi demanded fearfully. She started running after them. "Those men have guns—"

Aaron realized she must think he was running off to be a hero and try to physically confront the armed attackers. Her concern—and the fact that she thought he might consider doing that—made him smile. "Just heading home," he assured her. "We've got to get Mark out of sight before he's mobbed. Come on."

As they trotted along, the balloon-bells were chiming frenzied snatches of melody, and at least one main carillon was pouring out the grand sound of massed choir and symphonic orchestra performing the "Hallelujah Chorus" from Handel's *Messiah*. This Thirteenth Week holiday had descended into madness!

At last Aaron closed the door behind them and was relieved to see there was no mob following them. There was an anxious moment when a knock sounded at the door. But it was young Terrell, whom Aaron welcomed, and pulled inside hastily, shutting the door again. The young man stood there silently, regarding his father questioningly.

Aaron faced the elder Terrell. "We've got one chance to stop the slaughter. It

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all depends on whether you can still hack into the control systems."

Terrell pressed his lips together, reluctant to answer.

"Look, the attackers are trying to kill fifty thousand people with handguns. That takes time. They can't just run up and down the aisles, shooting into the stasis fields, because the bullets will just stop, and the kinetic energy will drain away from them. So they have to proceed one at a time, shutting off the stasis field, then killing the occupant before he comes fully alert. Even if there are as many as fifty gunmen, it will take hours."

"So we've got some time," Terrell concluded, then gave a half shrug.

"So if you can hack in and turn off all the stasis fields, release all fifty thousand people at once, they'll be able to defend themselves."

Cinthi sucked in her breath at this. Then after a moment, she observed doubtfully, "I've heard there are some colonists with cyborg enhancements. But what is super-strength against guns?"

Aaron nodded vaguely. "There's something we've been keeping quiet—so people would not get upset. But some of the colonists have full military cyborg enhancements—including implanted weapons systems, plasma guns and the like."

The others stared at him in shock, then mounting looks of dread. He eyed Terrell levelly. "Can you do it?"

Terrell looked downward and reflected for a moment, then gave a slight nod. "If I can get in—if the attackers haven't completely closed off the system. Yes, I could do that," he admitted.

Then he looked up and locked gazes with Aaron. "You do know what that would mean."

Aaron regarded him somberly, and glanced to one side for a moment to include the younger Terrell. "It would prevent a mass murder of all the colonists. And consider this: If we do nothing and all the colonists are wiped out, then those armed attackers would return. They would not submit peaceably to the authority of the council. They would have to impose a virtual military dictatorship on all of us, or else face summary judgment for their crimes. They've already killed crew."

Terrell said softly, "I know that." Then he repeated, louder, "But do you know what else it would mean?"

Aaron was slow to reply, and the full consequences began to unfold in his mind.

It was Cinthi who answered. "If the colonists are all brought out of stasis, they would find out about the mutinies. Both of them. And then we would not only be out-voted, we would be outgunned."

He stated slowly and distinctly, "But the only alternative is to stand by and allow the mass-murder of fifty thousand innocent people. *We can't do that!"*

Terrell looked at his son, silently inviting him to speak. Young Terrell looked up at his father and said, "We have to stop them, Dad—no matter what it takes. I don't want us to be ruled over by murderers."

The elder Terrell nodded.

"So will you do it?" Aaron pressed him.

"Maybe. When I hacked in before, I created a back door, like any competent hacker would do. Of course, they probably know about that one, since they would expect it and look for it." He grinned. "But I doubt they know about the other way I can get in—it is much more indirect. A flaw in the original programming that no one else noticed."

"Can you do it here, or do you need to go to some special console somewhere?"

"I can try it here. My com implant is a bit more robust than the standard model." With that he bowed his head, put a finger to his temple, and closed his eyes.

Long, uncomfortable minutes passed by. Beads of sweat appeared on Terrell's

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forehead.

Finally he heaved a shuddering sigh and looked up. "They tried to block off access, including the back door I created. But they didn't know about the other way in—it involves routing through the monitoring module for the nanotech programming system on the *Pitcairn Island*." He took another heavy breath. "It's done. The stasis fields for all the colonists have been turned off, and the controls are locked."

Aaron and Cinthi took each other's hands, and they waited. Terrell put his arm around his son's shoulder, holding him close. And they waited.

And they waited.

Aaron and Cinthi sat side-by-side, holding hands. Their daughter, Aria, sat on the floor playing with her daughter, Leah—their granddaughter. The cloud-streaked green-blue sky of Covenant shone through the windows.

The time had finally come when the planetary ruling council announced that the *Pitcairn Island* was finished, and any who wanted to—including the former crew of the *Magellan*—were welcome to become citizens of the permanent space city. The *Magellan* was also ready for new colonists and a new crew to set out for a more distant star.

But Aria, like many of the children of the former crew of the *Magellan*, having grown up planetside, decided she preferred to stay in the environment she was used to, where all her friends lived. Cinthi was unwilling to be parted from her daughter and granddaughter, and that decided Aaron as well.

Leah said she was hungry, so Aria took her by the hand and they went into the kitchen.

Aaron looked at Cinthi. "Some people say the name has religious connotations. But I think they named the world 'Covenant' as a slap at us."

Cinthi nodded. "Because we didn't live up to ours." Then she smiled, mischievously. "But I like our private name for it."

Aaron did not say it out loud, but he mouthed the words: "Botany Bay."

His wife shrugged resignedly, and repeated the old saying with a wry smile, "Consequences of the mutiny." □

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The Night of the RFIDs

Edward M. Lerner

A powerful new ability brings powerful new temptations. To what extent should they be resisted?

My chief of staff stood stiffly, clutching a leather folder. The single sheet of paper inside awaited my signature. Barbara said nothing, knowing the depth of my resolve, but her body language spoke volumes. By any conventional logic this was no way to begin a term of office.

I never wanted to go into politics. Sometimes we sacrifice our dreams for a greater cause.

I've been hooked on history since the third grade, when I heard about the Lost Colony. Paying for four years of college so I could teach American history in high school was the limit of my ambition—and a daunting challenge. Sometimes events demand more of us than we dare ask of ourselves.

More than twenty years later, I remember those events as though they happened yesterday. . . .

* * *

Sometime during the night the world had ended.

With no morning paper to confirm the obvious, my mother refused to believe. Instead, the lack of a *Gazette* had her full attention—that, and her inability to call anyone to complain. Dressed for work in her waitress uniform, she sat at our rickety dinette table, stymied in her morning ritual.

Our landline phone had no dial tone. The screen on my cell read: No service. Cable was out, too, and with it Internet access. At least the power remained on.

Well, Mom could complain to me, and did. I was of the wrong generation to understand getting news on dead trees; I couldn't have sympathized under the best of circumstances. These were hardly the best of circumstances. And fussing at me did nothing to deliver a paper.

Mom's coffee cup was nearly full. Fill-

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ing a mug for myself and tasting it, I knew why. So much for the new coffeemaker she'd bought the day before. "Who knew Quick-E-Shoppe even sold them?" she'd said. "While I was getting gas, a promo came up on the pump display."

Pouring the bitter sludge into the kitchen sink got me the "Timothy Alan Anderson, we don't waste food in this household" lecture. Impulsive coffeepot buys apparently fell under different budgetary rules. I chalked up the all-three-names broadside to circumstances, still wondering just what those circumstances were.

I burrowed in my closet for rabbit ears and Mom in her closet for our disaster kit. She won. We listened to a scratchy AM radio station. ". . . Worst across the Carolinas and into southern Virginia. The extent of the outbreak remains . . ." The report dissolved into a staticky hiss. I cranked vigorously to recharge the radio. When I finished, the station had moved on to the weather.

"Outbreak?" Mom repeated. Her eyes darted to the open disaster kit on the kitchen counter. I was just barely old enough to remember when household disaster kits *didn't* include plastic sheets and duct tape.

The dinette window was open, the gingham curtains billowing in the breeze. If a biological were loose nearby, we were toast. I must not have believed that, because thoughts of toast reminded me I had yet to eat breakfast. "Malware of some kind, I think. You know, like a computer virus. It could explain no cable or phone. I'll bet that's why there's no morning paper. Computers set the type and run the presses."

"That's not so bad," Mom decided. "If they fix it, I mean."

For a while the room was silent but for the ticking of the kitschy wall clock, a black cat that waggled its eyes and wagged its tail in synch. More car horns than usual, somehow more impatient than usual, intruded. Computers down meant traffic lights out. The morning commute would be bad.

Commuting—and school—after the end of the world seemed *so* unfair.

"I'd better go, Tim. I'll be late for work." Mom sighed. She made no move for the door until I stood. I had morning classes, the first at eight. As for after school . . .

Damn the injustice, the obliteration of every computer on the planet would not close Seth's Secondhand Books.

Theory had it that community college was preparing me for the university. According to plan, next year I'd put that theory to the test. That presumed I managed to set aside enough money for tuition. It was possible, I supposed. Mom and I *might* quit obsessing over daily meals.

I didn't blame Seth Miller for paying me minimum wage. A used-book store is a calling, not a business model. Every book he sold was a victory over countless no-overhead competitors on eBay. Only that day no one in town could reach eBay. I remember hoping we might see *two* customers.

Truthfully, I didn't understand how Seth afforded to pay me at all. I was too young, when he offered me a job in my sophomore year of high school, to imagine anyone lending a hand. Or to connect that offer with Dad's recent death in Afghanistan.

Seth was nowhere in evidence when I got to the store. I was late, traffic lights having all defaulted to flashing red or yellow. Phone service remained out; there hadn't been any way to say I'd be delayed.

"Hey, Marc," I said. Marc Kimball was Seth's other charity case. However lame I was, a college student (if just barely) stocking shelves with old graphic novels and recycled genre books—Marc was lamer. It never seemed to bother him.

Marc nodded and kept whistling. He couldn't carry a tune in a bushel basket. Despite the John Deere cap and the hair

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curling up at his collar, I had my doubts he would recognize a bushel basket. He was about twenty-five, and—obvious when he felt talkative—a city boy.

Seth paid Marc off the books, no pun intended, something I wasn't supposed to have noticed. I guessed that explained why Marc worked here. He had appeared about four months earlier. When I asked, making conversation, "So where are you from?" Marc's answer was, "Around." He was amiable enough, just private. Besides working at the bookstore he did freelance computer repair. Those were cash transactions, too.

Between customers, which was most of the time, we talked about movies and music and books. Marc spoke fast and flat like my cousins in inside-the-Beltway northern Virginia, for all intents and purposes a Yank. In rural South Carolina that made him a foreigner. The little old ladies who ran the tiny museum for our local Civil War skirmish site—battlefield was far too grandiose a term—still turned away vehicles with northern license plates, smiling sweetly as they claimed their parking lot was full: one more states' right. Within the museum, the late conflict between the states bore no aspect of civility and was labeled the War of Northern Aggression.

Still, I doubted even the Charleston office of Homeland Security considered Yanks illegal aliens. As harmless as Marc Kimball seemed, he was wanted for something, or guilty of something, if only tax evasion. That he was a movie buff was one of the few things Marc freely revealed. So maybe he knew this old movie, too. . . .

The Fugitive was based on a TV series from well before my time. Movie and show alike were about a man on the lam, escaped from prison, desperate to prove his innocence. The hero's name was Dr. Richard Kimball. So was Kimball a too-cute alias or merely a coincidence? I'd never had the nerve to ask.

UPS had delivered a stack of boxes. I sighed, knowing the massive sorting task that lay ahead. Seth purchased whole libraries from estate sales, sight unseen, for pennies a book. At that price we usually overpaid. Still, we'd occasionally come across a gem, say, a rare first edition, worth more than the store grossed in a month.

"You're quiet today, Tim," Marc said suddenly. He was in the mystery section, shelving paperbacks with enthusiastic taps on their spines and a certain *je ne sais quoi*—only in hindsight, I *can* say *quoi*: scarcely contained exhilaration.

"Nothing works today!" I snapped. My cell phone was an inert lump in my jeans pocket. A day without texting was . . . unnatural. "Why are you in such a good mood?"

A shrug: It doesn't affect me. "What have you heard about the outages?"

My psych prof commuted from Athens, Georgia, outside the dead zone. She'd listened to radio news for most of her inbound drive, and the class had peppered her with questions. I summarized. "A really nasty virus on the loose. Destructive. Best guess is it's been dormant, below the radar, for months. Today it's popped up everywhere, especially widespread in the Carolinas. We're back in the Dark Ages."

Gesturing at the shelves, Marc laughed. "Not quite. We have plenty of books."

Then Seth came through the door, huffing a bit. He was middle aged and heavyset, and the day was hot. "Be of good cheer, gentlemen. Stuff is coming back up. The Exxon station can pump gas again. You just need to pay with cash."

Gas pumps, if only standalone. The traffic light outside the store had stopped flashing and now showed green. Maybe the world hadn't ended, merely been struck stupid. Why was my friend and coworker so indifferent? "A return to normal would be a good thing, Marc."

Marc shrugged again and returned to shelving mysteries.

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* * *

A newspaper came the next morning. The virus taunted us from every front-page story.

While Mom read, grimacing at her coffee, I channel surfed. Cable was back—and it wasn't only basic. Suddenly, we had premium service. *Everyone* had premium service. Yesterday's malware attack had trashed the cable company's customer records. I would enjoy the free HBO while it lasted. Internet access remained out.

It wasn't just the cable company. Customer records all over had been scrambled. Like cable channels, things that could be offered to everyone came quickly back online. But credit cards, toll-road transponders, pagers—services involving individual accounts . . . those were hobbled or remained offline. In the CNN screen crawler an endless line of companies forecast their returns to service. I began to have hope when my cell came to life, limited to local calling.

With one foot out the door, an alert on the local-access channel stopped me in my tracks. The Feds had declared the outages a terrorist incident. The National Guard had been called up to seal the area.

Hadley Township sat near the southern end of the quarantine zone. Outside the bookstore, Humvees rumbled up and down the street. Choppers flew over a couple times.

Marc wasn't around despite what the posted work schedule indicated. I asked Seth about that, and he shrugged.

Another Humvee rolled past the store. "This makes no sense," I said. "How will soldiers catch a hacker?"

"No," Seth answered. "It makes perfect sense—from *their* point of view."

Their. For a mere syllable, it carried a lot of feeling. I remember staring.

Seth said, "The National Guard can't be after the hacker, though I wouldn't doubt there's a promotion in it for anyone who somehow stumbles across him . . . or her. I'm guessing the Guard is here to keep everyone *in*."

I noticed the hesitation before "or her," but chalked it up to the odds. Most hackers were male. I had a more basic question. "Keep everyone in? Why? We haven't done anything."

The bookstore subscribed to the morning paper, another facet of Seth's fierce loyalty to the printed word. Still, I don't think I'd ever seen him use it for anything but packing material.

Today Seth was glued to the *Gazette*. He tapped an article syndicated from the Associated Press. "Have you seen how the bug spread? Through point-of-sale systems. Not just any POS system. Ones that work with toll-road transponders. Electronic key fobs. No-swipe credit cards."

Antiquarian leanings are only to be expected in the owner of a used-book store. Compared to Seth, my mother was a high-tech wizard. A cell phone was nothing short of miraculous to the boss. Why the sudden interest?

"Mr. Seth Miller? My name is Jones. I'm a federal agent."

A stranger stood in the open door, wearing a black suit despite the summer heat. He flipped open a leather badge wallet; Seth (and I, discreetly, from a distance—I had good eyes back then) dutifully examined it. Homeland Security Bureau, HSB, what the wags called Homeland BS.

A Fed in the flesh didn't make me feel waggish.

"Can I see a warrant?" Seth asked.

Agent Jones smiled humorlessly. "No need. Just tell me if you've seen someone."

Seth stiffened. "Who?"

Jones offered a folded sheet of paper. The fold covered everything but the headshot of a young man in dress shirt and tie.

Could that be *Marc* in the photo? I tried to picture my friend with a trim mustache and short hair, without glasses or the John Deere cap.

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"Don't know him," Seth said.

Jones didn't ask me. I looked young for my age and happened to be holding a graphic novel. He probably mistook me for a customer.

The grainy image Jones next offered Seth was probably from a security camera. I recognized the Hadley Exxon. And the man at the air pump in that photo, inflating the front tire of his bike? It was Marc, no question.

"That's the same guy?" Seth asked. "Sure, I know him. That's Marc Kimball."

"An employee of yours, I'm told," Jones prompted.

"Not really. He's done odd jobs for me."

My head was spinning, the least reason for which was Seth's dissembling. I supposed he lied to avoid trouble about failing to report wages. What could the Feds want with Marc?

Jones took back the photo. "I'd like to speak with him."

"Shouldn't you be doing something about the outage?" I blurted. I couldn't help myself.

Jones silenced me with a hard stare, then turned back to Seth. "Mr. Miller, do you know where I might find Kimball?"

Seth shook his head. "Sorry. What's he done, anyway?"

"I'd like to speak with him," Jones repeated, handing Seth an embossed business card. "If you see or hear from Kimball, let me know."

What could Marc have done to merit the Feds' attention amid this chaos?

Hadley's lone Internet café was across the business district. That made it a short walk away. They got Internet service by satellite, not cable, so I headed over on the hope they had connectivity.

They did. I clicked the Ten Most Wanted Fugitives link on the Homeland BS website. From the middle of the list Marc's picture stared back at me.

I had one answer, at least. Kimball *was* an alias.

***

Every couple of weeks, Marc and I went stargazing in the county forest preserve in the hills west of town. In hindsight, I didn't know how often *he* went. There were always six-packs hidden in the stream, nicely chilled, anchored by water-smoothed rocks. I was sufficiently enamored with access to his beer stash, me being still a few months under age and Mom being strict about such things, that I didn't wonder what else Marc kept in the woods.

We'd head out right after dinner, the going being easier before sundown. We'd shoot the breeze while we waited for dark. Thinking back, it's clear Marc steered the conversation away from himself. That didn't take great conversational skills—I was pretty shallow back then.

Sometimes we'd kick around the same topics as at work. Discussing books and movies and music unavoidably touches on politics. Benjamin Disraeli once said, "A man who is not a Liberal at sixteen has no heart; a man who is not a Conservative at sixty has no head." I was a lot closer to sixteen than sixty, and not shy with my opinion that the country was going to hell in a hand basket. It's easy to pontificate when you have no interest in getting involved.

Marc kept his own counsel. I chose to read into his silence that he also had misgivings.

But mostly we spoke of dreams. Mine involved making a difference—"Those who do not learn from history," et cetera—by shaping young minds. If Marc saw irony, given my callow youth, he kept it to himself.

His dreams involved space. Once darkness fell, he would point out the International Space Station streaking across the sky, or the Apollo landing sites, or whatever planets were in view. He would talk about the robots creeping across Mars, about the spacecraft exploring the outer planets, and about all we might learn by dispatching robots to Europa and Enceladus.

Even history majors had heard of Eu-

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ropa, if only that it was one of the moons of Jupiter discovered by Galileo. Enceladus was new to me. I learned it was a frozen moon, perhaps with a liquid water ocean beneath its icy surface, perhaps with *life* within its oceans, orbiting distant ringed Saturn.

Beneath twinkling stars Marc spoke with a wistfulness I didn't understand. Surely someone with Marc's computer skills could find employment closer to the space program than Seth's Secondhand Books. NASA Huntsville was an easy day's drive from here. He deflected my questions with self-deprecating remarks until even I gathered he was changing the subject.

Marc being on the lam would explain a lot.

I tried to imagine my friend as somehow the cause of this madness. Why would he do such a thing? On the most-wanted list, the name beneath Marc's picture was Zachary Boyer. Googling that name only confused me further.

What master terrorist keeps a blog?

Sipping overpriced coffee, I skimmed screen after screen of blog entries. My mind's tongue kept tripping over the acronym RFID until I began treating it as a word: are-fid. Radio-frequency identification.

I knew little more about RFIDs than what the plain words behind the acronym suggested, but Marc/Zachary went on and on about them. Jamming them. Spoofing them. Removing them. Comments and linksback to his blog postings suggested he had a large following.

Oh yes: The blog freely offered that Homeland Security was after him.

I had done nothing wrong, but guilt came easily. I *could* have told Agent Jones I knew Marc Kimball. Hell, I knew where Marc lived. So why had I said nothing? Following Seth's lead, in part. Maybe a little of my inaction stemmed from an irrelevant memory: In *The Fugitive,* Richard Kimball was innocent.

I knew so much more now.

The virus wreaking havoc had lain dormant for months, and the Carolinas were the epicenter of this attack. Marc had appeared here in Hadley, South Carolina, a few months ago. Marc knew computers—and his fugitive alter ego was wanted for cyberterrorism.

And still I dithered.

Maybe I just couldn't believe Marc was the criminal type. I sure as hell didn't see him as a terrorist, cyber- or otherwise.

No one in the café paid me any attention, my silent surfing no competition for the argument that raged at the counter. Despite myself, I couldn't tune it out. I listened in growing dismay.

The National Guard wasn't merely stopping people at the nearby state border. You couldn't cross, no matter how upstanding a citizen you were, without a government-issued photo ID and an up-close and personal scan of yourself and your vehicle. Many people refused.

RFIDs? From Zachary's blog, the tags were hidden in clothing labels, toll-road transponders, car tires. . . . RFIDs felt like part of the puzzle, but there had to be more.

My booth gave me a view of the street outside the café. Across the road Jones stood speaking with two elderly passers-by. Looking uneasy, they studied a paper in Jones' hand, presumably with Marc's picture. It was only a matter of time until Jones found someone who would point him toward Marc. Zachary.

I *had* to know how Marc was involved.

I cleared the web browser's history file, cookies, and cache before slipping out the café's back door.

The Southern Hospitality Inne was old and rundown, with a Bates Motel feel about it. The locals mostly referred to the place as the Southern Comfort, after a weakness of the owner. It was Hadley's lodging of last resort, where half vacant meant booming business.

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That day, the Southern Hospitality's parking lot was oddly full. Most of the cars bore out-of-state plates. People milled around in the lot, and the motel's tiny office was jammed.

I ambled past, catching snippets of conversation. The Guard had turned these people back at the highway out of town. There was more talk about scanning as a condition of passage.

Some of the strangers were mad as hell. More were scared. No one admitted to having seen it, but several claimed to have talked to someone who knew someone who had heard from someone else . . .

Could the Guard be shooting people for trying to sneak past a roadblock? That was *insane* and yet somehow eerily believable. "Enemy combatant" was all too elastic a term. Call someone an enemy combatant and due process went out the window.

(Rumors of border shootings persist to this day, ever unconfirmed. I can finally find out the truth. It's a scary prospect.)

I studied the map tacked to the town Welcome sign, on the state highway just past the motel. National Guard checkpoints were prominently marked. Leaving my car in town had been a good decision. I figured a route around them and kept walking.

An hour later I knelt by a familiar stream, fishing in the cool waters for a brew.

"I could use another," Marc called. He perched on a boulder beside the mouth of a small cave. From where he sat you could see half the sprawling forest preserve by day and half the starry sky by night. I wondered if we'd ever stargaze here again.

We clinked cans, drinking in companionable silence until the words burst out of me. "Are you him? Did you do it?"

He thrust out his hand. "Zachary Boyer. Zach to my friends."

"I wasn't followed," I said. I was mad at him for past deception, and mad at myself for ignoring the implied question.

Of *course* he was my friend. He was practically the brother I'd never had. I had shared my hopes and dreams with him. I was young and self-absorbed enough to believe that entitled me to know everything, as though my banal ambitions merited him putting his liberty at risk.

He didn't sense my turmoil, or he chose to overlook it. "Good to know. Yes, I wrote a virus. I set it loose. You've seen sales terminals that read credit cards without swiping? The virus spreads wirelessly through them." He paused for a long swig. "I can't help noticing you didn't ask me why."

Yet I *had* to know that. Why else had I come? "Cyberterrorism is a far cry from robot explorers on Europa."

Zach winced. "Priorities."

"You'll have to do better than that," I said.

"You're better off walking away."

I stayed put and Zach sighed. "If you want to know, I'll tell you. Excuse me for packing at the same time."

"RFIDs," I guessed.

"RFIDs." Zach stood and I followed him several paces into the cave. With a grunt, he shoved aside a massive slab of stone. A food stash had been hidden behind it, everything dehydrated or freeze-fried. A wad of old bills nestled among the sealed packets. "I didn't truly expect to have to hike out. I never imagined the quarantine would be established this fast."

He loaded a scuffed leather backpack as he spoke, methodically selecting packages and wedging them into place. "Anyway, about RFIDs. They're tiny silicon chips embedded in credit cards, shoes, tires, E-ZPass transponders, you name it. Cash, even, in recent bills. If it's new, it's chipped."

"For faster checkout?" I guessed. "Counting cash in the drawer?"

"And taking inventory with a quick ra-

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dio *ping*. And access-control cards. Lots of reasons." He kept cramming in supplies. "Anywhere the chips go—the Feds know."

But *he* had gone undetected for months. I said, "Not everywhere, obviously."

"As it happens, Tim, I'm an electrical engineer. I'm pretty good at finding and disabling the damn things." He winked, and for a moment he seemed like . . . *Marc*.

As quickly, the moment passed. I said, "Then how did they track you to Hadley?"

He shrugged. "I'm hardly a criminal mastermind. I really don't know how. I'm surprised it took this long."

In the distance a train whistle blew, low and plaintive. I still didn't understand. "So, RFIDs. How do they work?"

"As feats of engineering, they're actually quite elegant. Just a little silicon chip and an antenna. Mostly they don't carry an onboard power source. Batteries would make the tags too bulky and expensive for widespread use. The chip holds part numbers and serial numbers. For more sophisticated applications, the chip might do a bit of computing, too."

"Back up a bit," I said. "No battery?"

"RFID readers emit low-power radio signals. Your typical RFID tag extracts enough energy from a query signal to wake up, decide whether to answer, and modulate the weak reflected signal into a response. Passive tags like that are dirt cheap; readers are expensive."

That *was* neat. "So what's the catch?"

"Chains and franchises. They have corporate headquarters eager to suck every scrap of information into big, juicy databases. Those databases . . . Homeland BS covets them."

Businesses didn't come much smaller than in Hadley. We didn't have a lot of chain stores. Maybe that explained Zach hiding here. But no, he said he could find and disable the tags.

So: What about RFIDs? Subpoenaed or hacked, coerced or freely provided—federal access to the databases seemed entirely too plausible. And yet . . .

"You hear that?" Zach paused in his packing.

I shook my head.

He swept the landscape with a small telescope. "It's okay. Just Seth."

Seth came here, too? Once again, in my youthful self-importance, I felt disappointment.

Soon we heard Seth's shuffling, huffing approach. The short but steep climb up to the cave left him panting. He did a double take at finding me inside. "Hi, Tim." Seth pulled a wad of crumpled bills from his chinos pocket. "From petty cash. All old bills without chips. Best I could do on short notice."

Seth was in Zach's confidence! His hinting about RFIDs at the bookstore suddenly made sense. I felt more deflated than ever. "Why, Marc? I mean, Zach. What's this really about?"

Zach leaned against the cave wall. "It's about the NARCC."

Junior year in high school, my World Civ class had a unit on dystopias. *Animal Farm. Brave New World. 1984.* Scary stuff, but relics of a bygone era. 1984 had come and gone before I was born.

That day in the cave I learned how naïve I'd been. Big Brother was alive and well, only his true name was NARCC.

The National RFID Consolidation Center.

In my defense, who knew back then? Not Congress: Except for the intelligence oversight committees, Congress was in the dark. Not the press or the civil liberties groups. Not the companies strongarmed into providing daily feeds from their corporate databases.

The more intrusive the program, the closer to the vest Homeland BS held it. A secret data warehouse of most RFID readouts nationwide? It provided a window onto the lives of damn near *everyone*. That was the closest held program of all.

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Zach had heard rumors about the NARCC as a computer consultant at Homeland BS—a discovery that helped send him underground. No wonder Homeland BS was so eager to bring him in.

No wonder the Feds were so diligent about suppressing his web presence.

They didn't succeed, of course. The blog I'd skimmed was hosted on an offshore website. And yet the blog, for all its anti-RFID fervor, never mentioned the NARCC. To avoid drawing attention to Zach's ultimate target?

My mind reeled. RFID tags in my clothes and sneakers, even the money in my wallet, shouting my presence to every store I walked past. RFID tags in the tires of my car, potentially read and recorded at every gas pump and toll plaza I passed, even when I paid with cash. Not very often in Hadley, to be sure, but unavoidably in any big city across the land.

But it wasn't only me; it was three hundred million or so of my fellow citizens. Never mind unreasonable search and seizure. I was a wannabe history major; I couldn't imagine how anyone might handle so much data.

Only when I asked, Zach made it sound simple: divide and conquer. Even my ancient iPod had an eighty-gigabyte hard drive, and Apple kept selling iPods by the millions. Parts Apple bought, the Feds could, too. Storing vast amounts of RFID data seemed practical enough. But finding anything within it?

"It's no big deal with a parallel supercomputer," Zach said. "The data streams start out time sequenced, organized by the location where the tags were read. Companies would have to go out of their way to *lose* that presort. Correlating data across different sources isn't that big a deal either. Credit-rating agencies do it all the time with consumer records."

I was in near shock, but none of this seemed to surprise Seth. He and Zach were kindred spirits despite Seth's technophobia—or in an odd way, perhaps because of it. It wasn't especially warm today, but Seth was sweating. He wiped his forehead with his forearm.

"And the NARCC is nearby?" I guessed.

"NARCC is a distributed system." Zach paused to knock back the last of his beer. "The primary regional center for the Carolinas is in Charleston. Its backup site is in Charlotte."

Both cities were within the quarantine zone. That couldn't be coincidence. But why *this* region?

Seth wiped his forehead again. "You guys have more beer?"

"Coming up," I said, turning toward the cave mouth. There was motion in the bushes about fifty yards beyond the stream where the beers chilled. "Zach, it's probably nothing but . . ."

Zach looked where I pointed. "Seth, could anyone have followed you?"

Seth frowned. "Honest, I was careful. I saw a late-model domestic sedan parked up the street from your apartment building. Among all the pickups, it stuck out like a sore thumb. I assumed Jones and his Homeland BS friends were looking for you, so I kept going."

"We're in trouble, guys," Zach said. "Seth, if you spotted a stakeout, the chances are someone spotted you." And followed Seth here, logic continued.

I had done nothing wrong, and yet I was terrified. The NARCC was apparently a deep, dark secret. What happened once Homeland BS reasoned I knew what Marc knew?

I pulled the little telescope from an outside pocket of Zach's knapsack. "There's definitely someone behind those bushes."

I'd once imagined Zach had been drawn to this spot by the vista. I changed my mind when he revealed the food cache. There was another way out of this cave, and it emptied into rough terrain that extended up past the Tennessee border. Eric Robert Rudolph, the extremist behind the Atlanta Olympics

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bombing and several more besides, had gone to ground in Appalachian terrain like this—then avoided capture for five years.

I picked up Zach's backpack. "Time to go. Now."

He pushed past me, ignoring the pack. I turned to see what was so urgent.

Seth had slumped onto the cave floor.

Seth's skin was clammy, his breathing shallow and labored. "Heart attack, I think," Zach said. He rolled Seth onto his back and began CPR.

"Get going," I said, although my own heart was pounding. "I'll look after Seth."

"Do you know CPR?"

I didn't. "Show me."

"Not the time for on-the-job training, Tim. I'm staying." Zach did chest compressions as he spoke. "Do you have cell reception?"

I checked. "No."

"If it's Seth the Feds followed, they may not know you're here." A pause for mouth-to-mouth. "Tim, your fingerprints are all over the beer cans. Wipe them off and *go*. In thirty seconds, I'm shouting for help. Maybe whoever's watching can radio for a medevac chopper."

I went.

I was scarcely out the cave's back entrance when I heard the *thp-thp-thp* of a distant helicopter. I stayed under the leafy canopy as best I could, planning to approach town far from the forest preserve's main entrance.

My mind and stomach churned. So I happened to know a criminal. I hadn't even lied to Jones, since he hadn't deigned to question me. Why should I feel guilty?

The better question was: Why shouldn't I?

I had abandoned a friend. I'd even been too self-absorbed to say he still was my friend, shame I would carry with me as long as I lived. My ignorance of CPR doomed Zach to capture.

But more than guilt and shame and fear for Seth roiled my thoughts. Zach's excuse, or explanation, or rationalization—I hadn't decided which—had been interrupted by Seth's arrival. Zach had admitted to setting loose the computer virus. That was unambiguously a crime.

Yet somehow it was all about the NARCC. And not just any NARCC, but the Charleston regional center.

I plodded through the woods, circling town, the deepening gloom an apt metaphor for my thoughts.

Walking up Main Street, there was no mistaking the town's ugly mood. Some people were worried. Some were scared. *Everyone* was angry—not at a computer virus, or the hacker behind it, but at the Feds.

There was an army base near town, and the army brats all went to Hadley schools. I was an army brat, too; I used the term affectionately, but one of my "peers" had mostly grown up in New England. We called Kelly our foreign-exchange student. She dropped her R's, thought grits were disgusting, and said of the Civil War, "Get over it."

Kelly's family was long gone, but I found myself wondering what she'd have said about current events. In the Palmetto State, we took states' rights seriously. Still. Washington calling up and federalizing *our* National Guard to keep *us* from traveling . . . that wasn't going down well.

Mayor Jackson was manning the figurative barricades. His great-great- (I forget how many greats) grandfather was Stonewall Jackson—something the mayor would let no one forget. "We will not surrender our freedoms," he thundered as I approached the courthouse.

I slogged past, my circuitous hike the least cause of my exhaustion. By now Marc/Zach was in federal custody and Seth was . . .

I hurried to Hadley's only hospital,

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hoping that Seth was still alive.

The volunteer at the reception desk sent me upstairs to the cardiac care unit. "Hey, Clay," I greeted the policeman standing guard in the hall. We'd known each other since the fourth grade. Clay looked as unhappy to be there as I to find him.

Seth spotted me through the open doorway. "Come in, son," he called. His voice was encouragingly firm. He had cranked the bed into a sitting position. The plastic tube under his nose was connected by a coil of tubing to a wall-mounted nozzle. Oxygen, I guessed.

Monitors crowded the room. Something beeped softly. All my medical training came from *ER* reruns, but the slow and steady rhythm reassured me. "How are you feeling, Seth?"

"Not bad. Well enough to be impressed by the speed of the grapevine."

That grapevine remark had to be for Clay's benefit, lest he be reporting back to Homeland BS. I took my cue. "Yeah, someone in the Square mentioned it. I came as soon as I heard."

"Not surprising. I made a dramatic entrance." Seth coughed, and something gurgled in his lungs. "Medevac chopper."

He had the energy and presence of mind to coach the potential witness; he couldn't be *too* ill. Hell, he was exhibiting more presence of mind than me, rushing in here without an explanation prepared. He had made no mention of Marc/Zach, and I took that hint, too. It had finally occurred to me why Zach had been waiting by the cave. Not for me, and not for dark, but for Seth to arrive with that extra money. Getaway money. That might make Seth an accessory of some sort.

"What are you in for, Seth?" I asked.

"Respiratory arrest. It could have been a lot worse." He managed a weak smile.

Drawing again on my *ER* training, I took that to mean the chopper got him here before lung failure brought on cardiac arrest. "I should let you rest. I'll drop by tomorrow."

"Hold the fort for me, Tim?"

He'd asked me dozens of times to mind the store. "Of course."

"Sorry about this," Clay said softly as I exited the CCU. "Not my idea, Tim. The Feds want him watched."

Nothing said about watching me. It appeared I was home free. Somehow that troubled me, as though I were sitting out a fight I belonged in. "The Feds interested in Seth? Did they say why?"

"For now, he's a material witness. It turns out Homeland BS really wanted your buddy Marc, only that's not his real name."

"Wanted?" I repeated.

Clay nodded. "They have Marc in custody. Choppered him out already."

I returned the way I had come, down Main Street to Town Square. The crowd, if anything, had grown. Mayor Jackson had ceded his spot at the center of the courthouse porch to a tall woman I didn't know. Her Charlotte 49ers baseball cap suggested an out-of-towner.

Mom caught my eye from across the square, and I made my way over. "What's going on?" I asked.

"Venting," she said, as though that explained everything.

And maybe it did.

"... Not just people, either. Whatever you had in your vehicle—luggage, parcels, you name it—they scanned that, too!" 49er fan was red in the face. "Refuse and they turned you back."

Apparently she had refused.

"They?" I whispered.

Mom tipped her head in answer, toward where a thoroughly unhappy-looking squad of soldiers stood watching. National Guard, presumably, but not from the local company, or I would have recognized some faces.

A balding guy, another stranger, replaced the 49ers fan. Mrs. Nguyen, the town postmaster, replaced him. A burly

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man in a tight and faded U2 T-shirt went after her. Half the people in the square had a story to tell, and I lost track. Tourists. Business travelers. Folks wanting only to visit out-of-town relatives. Some people must have submitted to scanning and been allowed to pass, but they weren't here to present another viewpoint.

The watching guardsmen said nothing.

I multitasked, half processing the repetitious narratives, still groping for an explanation. Zach's cause was RFID abuse. The scanning everyone complained about? It surely involved the RFID tags embedded in their cars and possessions. That wasn't only my guess; several angry orators thought as much. But why?

My stomach rumbled, and Mom glanced my way. It occurred to me that I hadn't had anything to eat since an early lunch. "I'm fine," I told her.

You know how people behind the counter at fast food places always ask, "You want fries with that?" Some of my friends worked fast food. No one expects any initiative from counter jockeys; the point-of-sale terminals prompted them.

It wasn't a big leap to imagine tie-in selling taken to the next level. A department store that polled the RFID tags in your clothing, so the most colorblind salesperson can recommend ties to match the shirt you're buying. Walk past the same store a year later wearing that same shirt and get texted with a coupon for a newer style. Get a fill-up and the gas pump displays an offer to replace your old tires, or—mystery solved—offers a coffeepot if there's a can of coffee in your car. Run a string of errands, toting your purchases from store and store, and—

I shivered. Anything became possible. Two days ago I'd thought web ads targeted to my surfing were intrusive and creepy. Of *course* some businesses allowed their RFID readers to scan for more than just what they sold. And once *they* had information . . .

Zach hadn't explained everything to me—he hadn't had time—but it seemed like his virus was meant to infiltrate the NARCC.

My thoughts churned. The NARCC. RFID consolidation. A virus dormant for months. Scanning everyone's RFID-tagged possessions. The NARCC. Hold the fort.

Hold the fort!

"Have you ever been to Fort Sumter?" I asked abruptly.

Barbara looked mildly embarrassed. In her nasal Midwestern twang, she said, "Maybe it balances things that I haven't visited Appomattox, either."

I had to smile. "Fort Sumter is a main tourist destination in Charleston. The old fortification occupies a manmade island smack in the center of the harbor mouth, from which its cannons once controlled all sea access to the port. Take a National Park Service tour boat—that's the only way out to the island. The ranger will explain that the fort was built as a consequence of the War of 1812. She'll tell you construction began in 1829. Then she'll skip to 1861, Confederate bombardment of the fort, and the start of the Civil War. The curious lack of urgency after the War of 1812 will go unmentioned—

"Like the first time South Carolina seriously tried to secede."

"The *first* time?" Barbara echoed.

The repressed history teacher in me never required much encouragement. "The true legacy of the War of 1812 was war debt and higher tariffs. The tariffs kept climbing, kept playing regional favorites, until things came to a boil with the Tariff Act of 1828. That act quickly became known in South Carolina as the Tariff of Abominations.

"In 1829, the federal government suddenly began shipping what was ultimately seventy thousand tons of New England rock to build up a sandbar at the mouth of Charleston harbor.

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"The South Carolina legislature eventually empowered a convention that declared the Tariff of Abominations null within the state. Both sides prepared for conflict. The national constitutional crisis stretched on, the hated tariff forcefully defended by that *other* Jackson, Andrew. Finally, in 1833, tariffs were substantially reduced but the state's right of nullification was effectively repudiated.

"And construction of Fort Sumter continued. . . ."

Hold the fort.

I took the broad, flat courthouse steps three at a time. Mayor Jackson blinked—I had never been one to make waves—but ceded the bullhorn when I reached for it.

Why had Zach come *here?* For Seth's help, I'd thought at first. Perhaps, but not just that. Even the cursory look I'd taken at Zach's blog—so much had happened since, it seemed impossible that had been only a few hours earlier!—revealed hundreds of supporters. They must be scattered across the country.

Because of the NARCC down the road in Charleston? Zach had said it was a regional center. Why target it and not another of the regional centers?

Simply because if Zach hadn't come here, I wouldn't be asking these questions? Too pat.

Hold the fort. Seth always said that before leaving me in charge at the bookstore. He meant nothing special by it—but the phrase had evoked something in me.

I gazed out over the crowd, my mouth gone dry. "Friends." The word came out a croak. A few in the square chuckled—not the reaction I was going for. Mom looked confused, and I couldn't blame her. At parties, I usually gravitated to a quiet corner.

I didn't know what to say, only that things needed to be said.

I lowered the bullhorn, cleared my throat, and tried again. "Friends." This time my voice boomed across the square. Again, still louder, "Friends!" The crowd quieted. "I'd like to explain what's going on."

The words tumbled out of me, surmises become certainty. To this day, I can't fully reconstruct the speech that propelled me into public life. But I understand why Zach chose a small town in South Carolina. The virus he planted would have fared equally well against any of the regional NARCC centers. What made *here* special was history. Was who we are.

"Why quarantine us? It starts with the RFID tags in much of what we own. The tags are put there for mundane purposes like taking inventory. The *same* tags let Homeland BS monitor where you go as easily as you surf to find what's playing at the Cineplex.

"But the Feds aren't watching *me*. That's what you're telling yourself. You're probably right—till you happen to pass, or be a friend of a friend of someone in whom they have curiosity. Until you check out a library book that doesn't pass official muster. Until someone just gets curious, or mistakes you for a 'person of interest.'

"Think you can buck the system by shopping with cash instead of credit cards? Withdraw cash from your bank, and the tags embedded in the currency are associated with you. What you buy with cash at most stores"—but not Seth's Secondhand Books, where the cash register was a cigar box—"gets associated with you. After that, the tires on your car and the shirt on your back announce you to every RFID reader you pass."

People had been angry and confused. Now comprehension replaced confusion. Their expressions grew ever grimmer.

I kept going. "How does one more computer virus enter into this? Here's what I think.

"This virus must have scrambled RFID tracking databases in"—I *almost* said

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Charleston and Charlotte, which would have revealed knowledge best kept to myself—"that is, that cover the Carolinas. How can the Feds spy on us now? Sure, RFID readers will still see tagged items go past—only that data is useless unless they know who owns that shirt or those truck tires.

"So *that's* why the quarantine. If you were allowed"—I made air quotes—"allowed to go to Atlanta or New Orleans or Chicago, the Feds couldn't later retrieve and second-guess your every step. *That's* what Homeland BS wants to prevent.

"Soon enough, attention will turn from the people caught on the road, from scanning whatever few things the travelers in the crowd happened to buy on their trips. My friends, the Feds will want to recreate a full database for each of us. Every RFID tag, in everything we own."

"They have no *right!*" shouted someone in the square.

"Where I go, what I buy—that's *my* business," another yelled.

So were most things any of us did. That didn't stop the government from taking an interest. I said, "Maybe they'll bring up the Patriot Act. Maybe they'll talk about 'regulating interstate commerce.' Mark my words, though: They *will* demand entry to every house and business, to scan everything we own, before letting us travel again."

"The *hell* they will!" This from tiny Mrs. Nguyen, who never uttered a cross word.

Those databases are abominations, I thought. And: Hold the fort. I raised my arms above my head until the crowd quieted. "Then we all refuse to be rescanned."

Mayor Jackson, still at my side, coughed. "Then what? Hadley becomes a commune, cut off from the rest of the country?"

"Not we, Hadley," I answered. "We, South Carolina. North Carolina, too, if they'll join us."

And so began the Third Secession.

"Mr. President?" The hand clasping the leather folder had returned to Barbara's side. She had the aura of one hoping for a reprieve.

"I was reminiscing," I said, "not having second thoughts. I'll take the letter now."

Reluctantly, she set the folder on my desk.

I wasn't quite done reminiscing. "It was a long road from the steps of the Hadley courthouse, to addressing the legislature in Columbia, to the state convention empanelled in Charleston. I was surprised to be named a delegate to that convention."

She managed a grin. "Then *only* you were surprised."

"I remember long walks along the Battery, the promenade on the harbor's edge by the grand old mansions." The Battery was where Charleston's citizens gathered on April 12, 1861 to cheer on the bombardment of Fort Sumter. "I remember the long weeks of debate whether to surrender our principles for the benefits of travel and trade."

And while we talked, the factory in Spartanburg that had until recently produced RFIDs found a better market. Soon they were running 24/7. *Everyone* wanted personal RFID locators and battery-powered jammers.

Untraceable, South Carolinians were quarantined—blockaded—in the name of national security. For our part, we welcomed anyone, from any state, who wanted freedom. Even Yanks.

Print, broadcast, web . . . every kind of reporter wanted to cover our deliberations. Countless people observed by webcam. "It was an amazing time, Barbara. The longer we debated, the more people across the *other* states began to ask why *they* should live beneath the federal microscope."

The ACLU and half a dozen privacy groups jumped on the bandwagon. Websites popped up listing products

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with embedded RFIDs—and more and more consumers boycotted anything that did. The Electronic Freedom Foundation championed a ban on RFID tags in all goods to be sold at retail.

Flinty old Senator Peterson of Vermont was the first to call on Congress to defund the NARCC, even before we in Charleston quite got around to our vote.

So it never quite came to secession, because everyone began flocking to us.

I unclipped the pen from my shirt pocket. I needed no one's permission, but I did want understanding. Barbara and I had worked together since my first congressional campaign.

"I respect your arguments, Barbara. I have considered them. Yes, Zach disclosed classified information. Yes, malicious data destruction was and remains a felony. Yes, disabling the Charleston NARCC doubtless hampered ongoing investigations. And yes, yes, yes—ends cannot justify means, or we'll be reduced to anarchy. But whatever crimes Zachary Boyer committed, he long ago repaid his debt to society.

"It's time society begins repaying its debt to Zach."

In my first official act as President of the United States, I signed Zach's full pardon. □

The use of traveling is to regulate imagination by reality, and instead of thinking how things may be, to see them as they are.

—Samuel Johnson

If we wait for the moment when everything, absolutely everything, is ready we shall never begin.

—Ivan Turgenev

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Halting State, Charles Stross, Ace, $24.95, 351 pp. (ISBN: 978-0-441-01498-9).

The H-bomb Girl, Stephen Baxter, Faber and Faber, $20.45 (£9.99), 268 pp. (ISBN: 978-0-571-23279-6).

Grimpow: The Invisible Road, Rafael Abalos, Delacorte, $17.99, 495 pp. (ISBN: 978-0-385-73374-8).

The Battle at the Moons of Hell: Helfort's War: Book 1, Graham Sharp Paul, Del Rey, $7.99, 376 pp. (ISBN: 978-0-345-49571-6).

Space Vulture, Gary K. Wolf and John J. Myers, Tor, $24.95, 333 pp. (ISBN: 0-7653-1852-0).

The Dreaming Void, Peter F. Hamilton, Del Rey, $26.95, 633 pp. (ISBN: 0-345-49653-1).

The Surgeon's Tale and Other Stories, Cat Rambo and Jeff Vandermeer, Two Free Lancer Press, $9.99, 96 pp. (ISBN: 978-0-8095-7268-7).

Physics of the Impossible, Michio Kaku, Doubleday, $26.95, 326 + xxii pp. (ISBN: 0-385-52069-7).

Recent years have been marked by periodic alarums concerning the parlous state of Internet security. In April 2007, for instance, the word (www.computerweekly.com/Articles/2007/04/24/223399/hackers-could-dent-economy-us-warned.htm) was that hackers could undermine U.S. economic competitiveness. In May 2007, Estonia suffered a massive denial-of-service attack (www.pcworld.com/article/id,131945/article.html). In September 2007, there was a report (www.foxnews.com/story/0,2933,298320,00.html) that hackers could crash the U.S. electricity grid. It's no surprise that Homeland Security, Defense, and other agencies are vitally concerned about the prospects of cyberwar, partly because a cyberattack is so cheap to mount that it need not come from sources traditionally recognized as enemies. Some tiny little nation or even a private group with a mad on could do the job. And of course a mad-on is hardly needed as motivation. Hackers are famous for doing things just because they can, showing off and scoring points for their prowess. Meanwhile, computer wonks are discovering that some tasks are not best done by computers alone. People can be enlisted to carry out small tasks—solving CAPTCHAs, answering questions, analyzing images, and more—that add up to large ones, such as digitizing old documents (news.bbc.uk/1/hi/technology/7023627.stm) or running search engines (www.chacha.com/info/about).

Science fiction writers, of course, are way ahead of the news, and the latest in this context is Charles Stross, whose **Halting State** is a grand read, fast, entertaining, provocative, timely, and maybe even prophetic. The scene is Edinburgh, 2018, and Sergeant Sue Smith has just been called in on a bank robbery. Unusually, the bank exists only in an online game; it stores treasure accumulated by players, and the robbery was carried out by a band of orcs. The robbery was

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called in by an employee at Hayek Associates, a new dot com that makes its nut by stabilizing the economies of game worlds. It's in trouble, for the robbery was for *lots* of treasure. Now Hayek's insurers want to know what's going on, and they're sending a crack team of auditors, including Elaine, a forensics specialist who does a bit of gaming as a hobby. She thinks they need someone on the coder side as a "native guide," so the call goes out for a skill set that turns out to match Jack, a game programmer who's just been laid off. So everyone descends on Edinburgh just in time to run into the team of crack security specialists from the EU, discover that whoever's responsible has hacked police communications and can listen in on anyone anywhere, and learn that a classic LARP (live-action role-playing game) is actually a government intelligence scheme, relying on volunteers who pay for the privilege of following instructions and playing secret agent in the interstices of real life.

Of course, it turns out that both Elaine and Jack are players of that LARP. When the game turns real, they learn that there are major international issues at stake, one of which is the vulnerability of critical infrastructure. The story, however, gains much of its life less from infrastructure problems than from quite traditional human greed and stupidity. Hackers are involved, but there is a non-hacker villain with very classic motives. There is also a tangled web of incidents and themes, supported by the well-developed characters of Jack and Elaine, of just the sort we have come to expect from Stross.

Don't miss this one.

Poor Laura. She's just fourteen. Her parents are separating. Her mum's old boyfriend is moving into the house. Dad works at the airbase, where everyone's on alert because it's 1962 and Kennedy and Khrushchev are toe to toe over the Soviet missiles in Cuba. And Dad's given her a key to keep with her at all times; in case of dire events (like nuclear war) she's to call a certain number, say she has it as well as the codes, and someone will come get her and keep her safe.

Laura hasn't a clue what the key really is. But at her new school, in a Liverpool where the Beatles are just starting out, one of her classmates recognizes it as belonging to a Vulcan bomber. Her teacher, Miss Wells, who looks alarmingly like a much older version of herself, hints that a very important Saturday is coming up in two weeks, on October 27 (hint: look up the Cuban Missile Crisis). And at a local basement club, the waitress, Agnes, carries a book that looks like a battered version of Laura's diary.

By now you're 50 pages into Stephen Baxter's **The H-bomb Girl**, and you already have an inkling of what's going on. Yup, time travel. But what are the time-travelers after? The Cuban Missile Crisis was a cusp moment in history. It could have led to nuclear war very easily, and at the time it seemed that there were two forms the war could take: preemptive, which might minimize the total megatonnage exchanged, or total. Either would do an immense amount of damage, but the tolls would not be the same. Nor would the societies that developed afterward. There could easily be three factions of time travelers on hand for the story: one to maintain the status quo, one for preemptive war, one for duke-it-out war.

Fourteen is another cusp. Like most teenagers, Laura is faced with a multitude of decisions that will shape her future life. Baxter reifies some of those choices by confronting Laura with her future selves and forcing her to make decisions that will affect not just her personal future, but that of the entire world.

Since most teens think they *are* the world, and their decisions are just as important to them, the result is a novel that young adult readers should be able to get involved in very easily. At the

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same time, they will learn a bit of history, including what it was like to grow up in a Britain for which World War II was a recent memory (with some of the bomb damage still to be repaired), under adults some of whom remembered the war fondly, as their youth, their time of excitement and glory.

To Laura, her time is normal. It's all she knows, really. But it also feels rather weird, in a way that easily matches the weirdness of fictional fantasy worlds. And that's *before* the crisis looms and the time travelers show up.

Order this one from Amazon for now. With luck, a US publisher will have it out before long.

Rafael Abalos is a Spanish lawyer who has discovered a talent for writing adventure tales. With the aid of translator Noel Baca Castex, Delacorte Press brings you his first novel for young adults, **Grimpow: The Invisible Road**.

Grimpow is a boy who has fled an abusive uncle to live with Durlib, thief and scalawag. One winter day, he stumbles across the body of a man in the snow. In his possession is a wealth of coins and jewels, as well as an odd stone that Durlib promptly passes to Grimpow, saying, "From now on, this stone will be tied to your destiny." And so it is, for it grants Grimpow the gift of reading any language before his eyes, and when they move into the nearby monastery for the winter, it lets him fit in as a student of the library monk and remain even after an inquisitor in search of a fleeing Templar (guess who the dead man was) arrives, Durlib leaves, and the abbot is murdered. Before long, the stone proves to have additional talents, a knight arrives, Grimpow signs on as squire, and the two are off on a quest for the secret of the Templars even as war against the last remnants of that banned order takes form.

Grimpow is one more of the rash of Templar novels following in the wake of *The Da Vinci Code*. The style is accessible to younger readers without being too simple for adults, but adults may find the plot predictable. In addition, readers accustomed to the way many novels lead the protagonists from frying pan to soup pot to oven to fire may find their progress here less than satisfying. The threats remain mostly offstage, while Grimpow collects puzzle clues that reveal themselves with unseemly ease to culminate with a noble call to high aspirations. The tale is thus charming enough, and educational in a light vein, but it lacks tension and suspense.

Fortunately—perhaps because he wrote in Spanish—Abalos manages to avoid bad jokes of the sort that often infest fiction for younger readers. At the monastery, there is a "cook monk," but this individual does not anticipate the invention of chips and is not cursed with the label of "chip monk."

Graham Sharp Paul has the background to make the military side of **The Battle at the Moons of Hell: Helfort's War: Book 1** reasonably convincing, but in his world-building he tends to sprinkle 15 kilometer high mountains around a bit too easily. He also contradicts himself from time to time, as when he calls an "elongated black egg" a "formless blob." But such things are quibbles. Overall, *Battle* is a fun read, from the beginning when Federation space cadet Michael Helfort is on the carpet for apparently taking unseemly chances with a planetary heavy lander (when he was really saving the day after scumball d'Castreaux turned off the automatics) to the dastardly scheme of the religious nut—but very un-Friendly—worlds of the Hammer of Kraa to hijack a ship and enslave the passengers (including Michael's mother and sister) to the deft invasion of Hammer space to recover ship and passengers and Michael's heroic survival of an all-odds-against encounter with Hammer forces.

Fun, as I said. But even my brief description is enough to make it clear that

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Paul has chosen to build a cartoon world using tried and true components. His religious nuts are evil. Few of his villains have any redeeming qualities at all, and the one in charge of the Hammer worlds at the end has none. Michael (as well as his family and friends) is noble and true. The action scenes are impressive but the outcomes are never in doubt. There is no real suspense—though there might have been if Paul had written *Battle* before instead of after so many similar tales—and the tale is really pretty predictable.

Read while riding a plane or commuter train.

Gary K. Wolf, creator of Roger Rabbit, and John J. Myers, currently the Archbishop of Newark, New Jersey, grew up together, discovered science fiction together, and both still love the genre. The doggonedest people are fans! And they get up to the doggonedest things—the book that turned them on as kids was Anthony Gilmore's *Space Hawk*, but when they took another look at it as adults, they realized that its appeal, let us kindly say, was limited. So they decided to redo it right—old-style pulp adventure, purest evil villain versus noble hero, fair maiden to be rescued, and so on. And now you can get your hands on **Space Vulture,** named for the villain: arrogant, egotistical, greedy, self-indulgent, power-mad, and super-intelligent to boot. The hero is Galactic Marshall Captain Victor Corsaire.

As the tale opens, Gil, a scalawag desperate to pay off his bookie and regain his eye and arm, is stealing Verlinap's valuable mushroom crop (they grow in permafrost, of all things) when Corsaire captures him. Unfortunately, Space Vulture shows up eager to capture Corsaire and grab Verlinap's small population—including the lovely widow Cali—to sell as slaves. Fortunately, Cali's two small boys hide successfully and join up with Gil when Space Vulture releases him. Unfortunately, Gil has no time for kids. Fortunately, the boys win him over, and they hie off hoping to rescue Mommy (and get the mushrooms back). Unfortunately, Gil's ship fails. Fortunately, they manage to get the life pod to a planet and find an abandoned ship. Unfortunately . . . You get the idea. Certain doom is endlessly delayed while a conspiracy of coincidences gathers momentum.

Overall, it reminds me of the television serials—endless strings of fifteen-minute installments, always ending on a cliffhanger—that were common when I was a kid. Even for that, though, it's over the top as only two long-time fans with fond memories can achieve. I suspect the tale's charms won't appeal to younger readers, but older readers who remember when will read it with a smile—even if they can't possibly claim it's great literature.

Set some 1,500 years after *Pandora's Star* and *Judas Unchained*, **The Dreaming Void** is a massive and intricate opening salvo for Peter F. Hamilton's new trilogy. Multiple plot threads wrap around a central theme: The galaxy contains an area known as the Void, which does not permit human entry. Ships that fly in are never heard from again. Yet it does contain a single settled world, and a fellow called Inigo, known as the Dreamer, has dreamed of life on that world, of someone known as the Waterwalker, and of the Skylord and shared those dreams with the collective consciousness mediated by the gaiafield created by the omnipresent gaiamotes, apparently some sort of nanotechnology-based telepathic Internet. One result is a cult known as the Second Dreamers who are planning a grand pilgrimage of their membership to the Void despite warnings from the ancient aliens, the Raiel, who have long studied and guarded the Void, that the pilgrimage may trigger one of the Void's periodic expansions, or devourings, and doom the galaxy.

Aliens demand the pilgrimage be

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stopped, but humanity, though it is dominated by the Matrix-like ANA into which everyone who wishes is downloaded, treasures its independence and freedom to make mistakes. No one has the power or influence—or if they do, they do not care to exert it—to stop the Second Dreamers. Indeed, they don't seem to think the disaster can happen, and they certainly aren't worried about the alien warfleet on the way to stop the pilgrimage.

Not that everyone agrees. There are factions within humanity and within ANA, and they have set their representatives to collecting information. One is even looking for Inigo, who vanished long ago. When it appears that there is another dreamer putting dreams into the gaiafield, the Second Dreamers mount a massive hunt, soon narrowing the target to a single world and city. They plan to annex the world, invade with troops, and seize the dreamer to enlist his or her aid in making sure the pilgrimage goes as planned. Others are hunting too, of course, and the alien warfleet is getting closer.

Meanwhile, meet Araminta. She is still young, still early in her expected centuries of life, recently escaped from a bad marriage, and striving hard to make a go of buying, renovating, and selling real estate. She is romantically involved with Mr. Bovey, a "multiple" with thirty or so bodies, and she is having strange dreams. Meet the creature that floats on gossamer wings between the stars, who just might deserve the name of Skylord. Meet Edeard, a country boy with a powerful talent for shaping embryos into useful creatures and as powerful a telekinetic "third hand." His village destroyed by bandits, he travels to the canaled city of Makkathran, where he signs up for training as a constable, is endlessly frustrated by the blatancy of the local gangs, grows stronger, and when a gang flees by gondola, pursues to grand and wondrous effect.

There is a great deal here to enjoy, especially if you like your SF novels big and fat, with the promise of more just as big and fat. Hamilton pushes the technology to and beyond the limits we are accustomed to and saves the expository lumps for the historical and social background. Those lumps may not be avoidable, given the depth of the past behind the story and the lengths of the characters' lives, but even those who have read Hamilton's earlier novels may appreciate the prompts to memory. Those who have not may wish for even more extensive background briefings.

Overall, a good fun read with promise of two more fun volumes just as worth your time.

If you like stories that feel like you should be able to remember them from your childhood Mother Goose and other fairy tales, try **The Surgeon's Tale and Other Stories.** Cat Rambo's-"A-Key Decides Its Destiny" is a mordant tale of a malign wizard and a dreamy but ultimately practical apprentice. His "Three Sons" is a nice biter-bit tale. Jeff Vandermeer's "The Farmer's Cat" is a very satisfying tale of ogres and a farmer who has had quite enough. "The Strange Case of the Lovecraft Cafe," by M. F. Korn, D. F. Lewis, and Vandermeer, displays a wondrous and frightening menu. Rambo and Vandermeer are jointly responsible for the title tale, in which a medical student is only partially successful at reanimating the dead, albeit with lasting effect.

Are *Analog*'s science fact articles too short for you? If so, you may want to get a copy of Michio Kaku's **Physics of the Impossible**. Kaku begins by noting his childhood (and continuing) fascination with science fiction and its technologies. He repeats the familiar line about SF stimulating budding scientists toward their careers. He notes that many modern technologies were once considered impossible, on a par with phasers and replicators and FTL travel, and he argues that physics has reached the point

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where we can divide "impossible" technologies into three categories: Class I impossibilities are those that may seem impossible today but violate no known laws of physics and might be realizable in the relatively near future; examples include force fields, invisibility (which has already been demonstrated in a very limited way), antimatter engines, robots (which hardly seem impossible with robot cars having just—last weekend, as I write this—proved capable of navigating city streets in the DARPA Urban Challenge), and even a kind of telepathy (in the sense that a suitable machine, perhaps based on MRI, could read thoughts). Class II impossibilities require science out at the edge of current theory; they include travel through time, hyperspace, and wormholes. Class III impossibilities violate *known* laws of physics; to become real they would require significant change in our understanding of the universe.

In his final chapter, Kaku recognizes that some things really are impossible. But the history of science—of physics in particular, for that is his field—abounds in examples of the impossible proving possible after all. And today there are new theories, new experimental approaches, and great and eager anticipation of the future. "There will always be things that are beyond our grasp . . . But the fundamental laws, I believe, are knowable and finite. And the coming years in physics could be the most exciting of all . . . We are not at the end, but at the beginning of a new physics. But whatever we find, there will always be new horizons continually awaiting us."

Very *Analog*ish. Go get a copy. □

IN TIMES TO COME

The more we learn, the more surprises we find. . . . Last June, Richard A. Lovett gave us a fact article on the wildly diverse moons of Saturn, *and* an action-packed novelette, "The Sands of Titan," set on one of them and introducing prospector Floyd "Phoenix" Ashman and his AI symbiote, Brittney. In our June issue he returns to other parts of that frontier with "Brittney's Labyrinth," just as engaging and intriguing, and again with a dramatic cover by David A. Hardy, but with very different—and no less challenging—surroundings. And there's one more important difference: this time we see the story through Brittney's "eyes". . . .

And Lovett is not one to stand still. He'll again provide the fact article, too, this time a survey of some of the newest scientific thinking about some of the puzzles sprinkled around in various parts of our Solar System—including Earth. I wouldn't be surprised to see still more stories growing from some of those a bit later. . . .

We'll also have tales by Ben Bova, Bud Sparhawk, Richard K. Lyon, and a couple of promising newcomers, making for a diverse and thoroughly entertaining issue.

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BRASS TACKS

Dear Stan,

I got behind on my "research," so it was only yesterday that I finished the November 2007 *Analog*, which prompted my realization that, in today's sociolegal climate, it's only a matter of time before stories like Carl Frederick's "Yearning for the White Avenger" are required to carry warning labels.

I read the story at breakfast, and had just taken a mouthful of orange juice when I got to "I might have saved him if Sniffles hadn't led me in exactly the wrong direction."

No kidding; Stan, Frederick's foreshadowing was fair and adequate; yet I have never been so utterly blindsided by a punch line.

Exit orange juice, via multiple facial orifices (I swear, a few drops even left via my tear ducts). A painful experience it was, too. Yet if I'd gasped, the consequences would have been more serious—and if that had been solid food and I'd gasped, without a Heimlicher in sight . . .

Anyway, that's the story idea: warning labels required on stories, similar to movie rating, based upon the degree of threat posed.

I'm nowhere near writer enough to bring it off. Actually, I'm nowhere near writer enough to judge whether it's a real story idea. Maybe in the right hands . . . I think I'll suggest it to Spider.

My complements to Frederick—and you for buying it.

David R. Palmer

Dear Stan,

I just read your November and December editorials within days of each other, and realized I had a "double standard" that might "help the medicine go down" (or not). At the beginning of October, I suddenly had a chance to go to Capclave (a nice little literary SF convention in the Washington, DC area). My first thought was to save some money by taking the train, so I checked with Amtrak, and discovered my round trip ticket would cost anywhere from $138 on up. That seemed a bit excessive. I checked the airlines, and found fares starting at $219. Then I checked my maps, discovered that the round-trip driving to and from Washington, plus to and from my friend's house (where I was sleeping) was less than 500 miles. Gas and tolls for the trip would be no more than $100, and I'd have the convenience of having my car with me, so I could travel on my own schedule.

I want to be good to the environment, to cut down on my greenhouse gas emissions, and all of that, but I have to consider what I can afford today first, and that meant driving was a no-brainer. So here's my double standard: more government regulation (ugh! ouch!). If we're truly serious about forcing ourselves to go the "green" route, perhaps we (as in, our government) needs to subsidize Amtrak a bit more, to get the cost of those tickets down to where they're actually competitive with driving ourselves. Raising tolls might help a lit-

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tle, but, well, consider what we do with cigarettes. The actual pack of cigarettes (including production and distribution), in a regular economy, should cost less than a dollar. But the federal and local governments add on so much tax that they're retailing for more than $6 now. Rather than complaining about rising gas prices, perhaps we should urge Congress to increase the taxes on gasoline, drive the price up past $10 a gallon. I know that would have driven me to ride the train.

Warning: the ideas expressed in this letter may not necessarily reflect my own views.

Ian Randal Strock, Editor
SFScope.com

Or it might have driven you not to make the trip. Your proposal is most likely appeal to those who either have access to good public transportation to the places they want to go, or those so wealthy that the price of fuel isn't really important to them. Its more widespread effect would be to put further financial pressure on the many people who already have trouble making ends meet and do not have access to good public transportation to the places they need or want to go.

Dear Stan:

Your December editorial, ". . . Help the Medicine Go Down," hit the nail solidly. People use automobiles because they are the most convenient and economical means of transportation available—far more economical than tax-subsidized public transportation, except in compact urban areas such as Manhattan.

The auto's problems of pollution and congestion are certainly solvable. Cleaner engines and fuels, including hybrids, electrics, and hydrogen fuel, would not only clean the air and slow global warming, they would help end our dependence on imported petroleum. Traffic congestion could be eased by "smart" cars that can drive themselves on electronic guideways and return to home or park themselves once the owner has reached his or her destination. Surely we have the technological smarts to develop such systems. Do we have the political will?

Ben Bova

Dear Dr. Schmidt,

Very good! It is said (and I believe it) that capitalism as an economic system works because it fits with human nature, rather than fights it (or words to that effect). We don't have a codified description of "human nature"; however, your analysis doesn't contradict what I think I know about it. And certainly your general prescription of working with, rather than against, it makes sense.

Oak Ridge, where I live, is in some ways a strange place. It was created for the Manhattan Project and has a large population of scientists, aging hippies, and other tree-hugging types <grin>. We have citywide recycling here—and it mostly works. The secret is curbside pick-up (by specialized recycling trucks). Most people simply separate their recyclables into the "green bucket" and their trash into the trash bins and put them out on trash day. It's only a little more work than putting it all into the trash bins. (Whether the whole thing is cost-effective is another story. Except for the aluminum cans, I'm not sure that the recycling doesn't use more energy/resources, etc., than it saves. And we do pay more in taxes to support the double trash pickup.) The point is that under certain conditions, such activities as you discuss can be institutionalized—and even induce cooperation by agnostics, such as myself.

Dean Hartley
Oak Ridge, TN

Stan,

Sarah Castle's "Kukulkan" in the December 2007 *Analog* certainly riveted my attention. I couldn't tell how it was going to play out until the very end. I do

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hope there will be a follow-up tale, as there seem to be loose ends left behind.

When the Cheorka ambassador Aranead sacrificed himself, there was still no leader from Earth who had actually agreed to sacrifice him/herself. Furthermore, the required annual sacrifice and the cessation of war on Earth had apparently received little consideration at the time. That is a lot of ground left uncovered for admission to the Universal Council.

Aranead's reason for self-sacrifice is definitely strange and alien. ". . . the humans of Earth, alone, represent mammalian intelligence in the universe." "Cheorka threw that meteoroid." "The time has arrived for us to make amends to Earth's conscious beings and to the universe." Is Aranead apologizing to us and to creation in general for our/the misfortune that we did not grow to consciousness and ascendancy as reptiles? If so, this seems to imply that we will occupy a sort of permanent underclass in universal society. We humans are certainly not sorry that the meteoroid caused mammals to rule the Earth, so he really needn't have done himself in on our account.

I was expecting the terms of the offer to the council to be received quite differently—President Stewart's reply to be approximately the following:

It is only reasonable that we promise not to make war upon other members of the Universal Council. That some leader of renown sacrifice him/herself for initial admission to the Universal Council is a decision entirely up to that person. However, the requirement that we cease making war among ourselves is not a commitment that we can realistically hope to live up to. Furthermore, that the Earth annually offer up a hundred-some persons every year to be sacrificed is not possible by our standards of justice. We know this objection to the taking of life seems a contradictory belief when we kill so many of each other in the institution of war. Few people will voluntarily offer themselves for sacrifice, and our societies cannot choose innocent lives to be taken as a symbolic gesture, as this seems just too great a waste to us for any amount of benefit. Thank you, Ambassador Aranead of the Cheorka for your offer to the humans of Earth to join the Universal Council, but we respectfully decline.

Definitely thought-provoking circumstances. I look forward to seeing more from Ms. Castle.

Ewing Taylor
Rockville, Maryland

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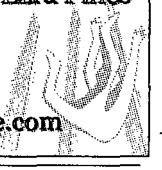

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ANNOUNCEMENTS

Alaska Writers Guild call for entries for Ralph Williams Memorial Short Story Contest. Grand prize: $5,000, division prizes of $1,000, to be presented at 2008 Speculative Fiction Writers Conference, Anchorage, October 1-5, 2008. Two written critiques provided for each entry. Contest deadline: April 15, 2008. For guidelines and application, visit www.alaskawritersguild.com, or write to: 9138 Arlon Street, Suite A-3, Box 910, Anchorage AK 99507

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UPCOMING EVENTS Anthony Lewis

23–26 May 2008
Balticon 42 (Baltimore SF conference) at Marriott's Hunt Valley Inn, Baltimore, Maryland. Guest of Honor: Connie Willis; Artist Guest of Honor: John Jude Palencar; Music Guest of Honor: Urban Tapestry; Masquerade MC: Martin Gear. Membership: $46 until 28 February 2008, $51 until 30 April 2008, $59 thereafter. Info: www.Balticon.org; balticoninfo@Balticon.org; (410) 563-2737; Balticon 42, P.O. Box 686, Baltimore, MD 21203-0686.

23–25 May 2008
CONduit XVIII: (General interest science fiction convention) at Radisson Hotel Salt Lake City, Salt Lake City, Utah. Guest of Honor: Michael A. Stackpole. Membership: until 1 May 2008, adult $35, teen $30, youth $17.50, child FREE, family (2 adult, up to 4 teen/youth) $125. Info: conduit.sfcon.org, CONduit, P.O. Box 11745, Salt Lake City, UT 84147-0745.

28–29 June 2008
ConRunner 2008 (UK/Euro convention runners conference) at Britannia Hotel Wolverhampton, UK. Membership: £40.00 until 21 June 2008; £50.00 at the door; £25.00 day. Details and online membership http://www.conrunner.org.uk or write to ConRunner2008, 56 Jackmans Place, Letchworth G.C., Hertfordshire, SG16 1RH.

10–13 2008
PORTUS 2008 (A Harry Potter symposium) at Hilton Anatole, Dallas, Texas. Membership: 1 February to 31 May 2008 $220.00; 1 June to 30 June 2008 $240.00; at the door $260.00. Info: http://www.portus2008.org/.

11–13 July 2008
OSFest '08 (Nebraska SF conference) at Comfort Inn & Suites, Omaha, Nebraska. Writer Guest of Honor: Aaron Allston; Artist Guest of Honor: Mike Cole; TM: Rusty Hevelin. Membership: $40 until June 30, $50 at the door. Info: www.osfes.org/osfest.htm; webmaster@osfes.org; OSFest '08, 7934 Grover Street, Omaha, NE 68124.

6–10 August 2008
DENVENTION III (66th World Science Fiction Convention) at Colorado Convention Center, Denver, Colorado. Hotels include Adam's Mark (party hotel), Hyatt Regency. Guest of Honor: Lois McMaster Bujold; Artist Guest of Honor: Rick Sternbach; Fan Guest of Honor: Tom Whitmore; TM: Wil McCarthy. Membership: (until further notice; see website): USD 175; supporting membership USD 40; child (until 12 as of 6 August 2008) USD 45. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Nominate and vote for the Hugos. Info: www.denvention3.org; president@denvention.org. Denvention 3, P.O. Box 1349, Denver, CO 80201 USA. ■

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